

## CITY OF DURHAM, NORTH CAROLINA

# DURHAM



1 8 6 9  
CITY OF MEDICINE

## WATER AND SEWER STANDARD DETAILS

(UPDATED September 24, 2010)

These details apply to all projects in for construction drawing review as of  
April 19, 2010

PUBLIC WORKS DEPARTMENT: 3<sup>RD</sup> FLOOR OF CITY HALL

ADDRESS: 101 CITY HALL PLAZA DURHAM, NC 27701

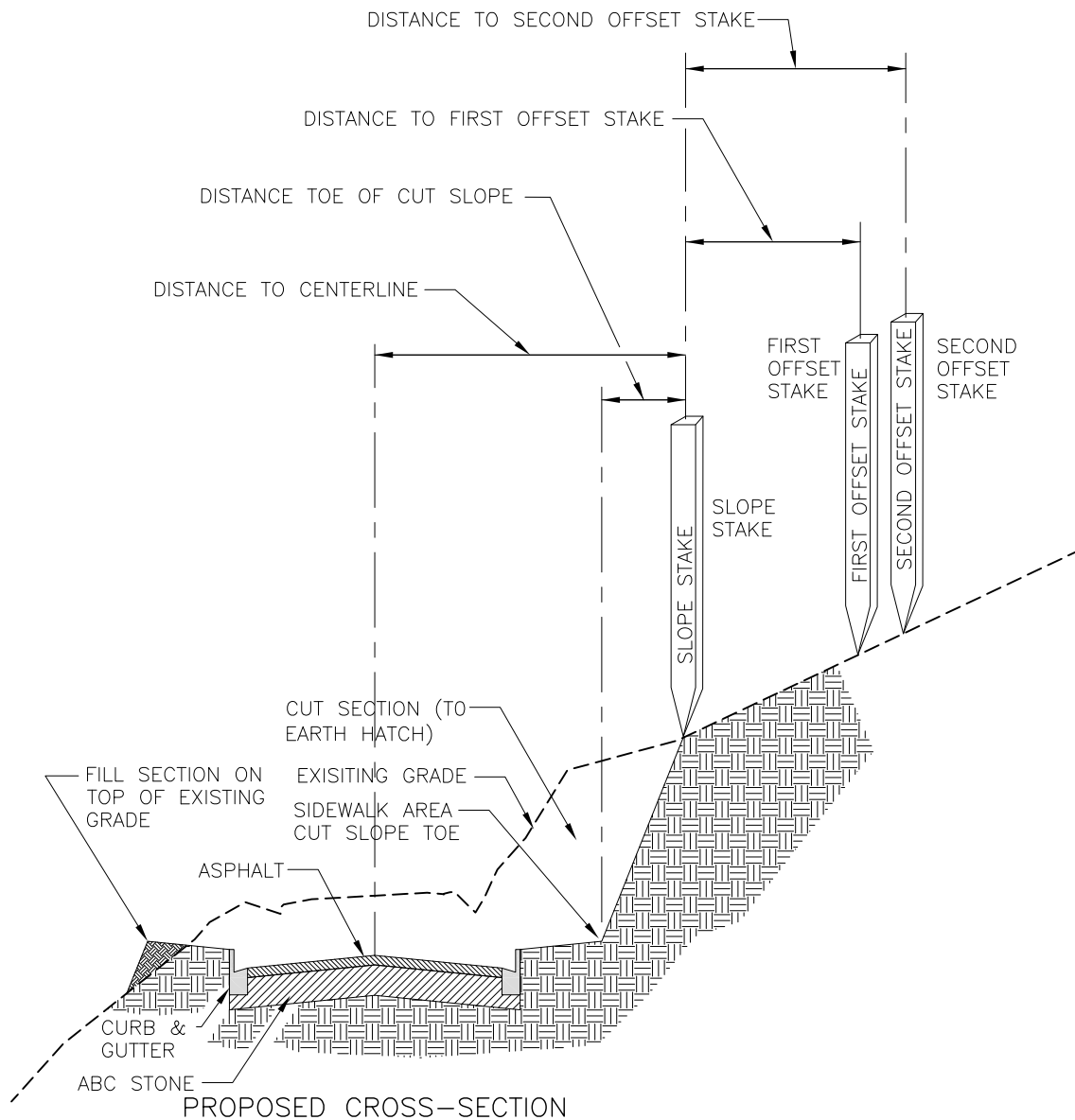
TELEPHONE: (919) 560-4326 FAX: (919) 560-4316

HOME PAGE: <http://www.durhamnc.gov/departments/works/engineering.cfm>

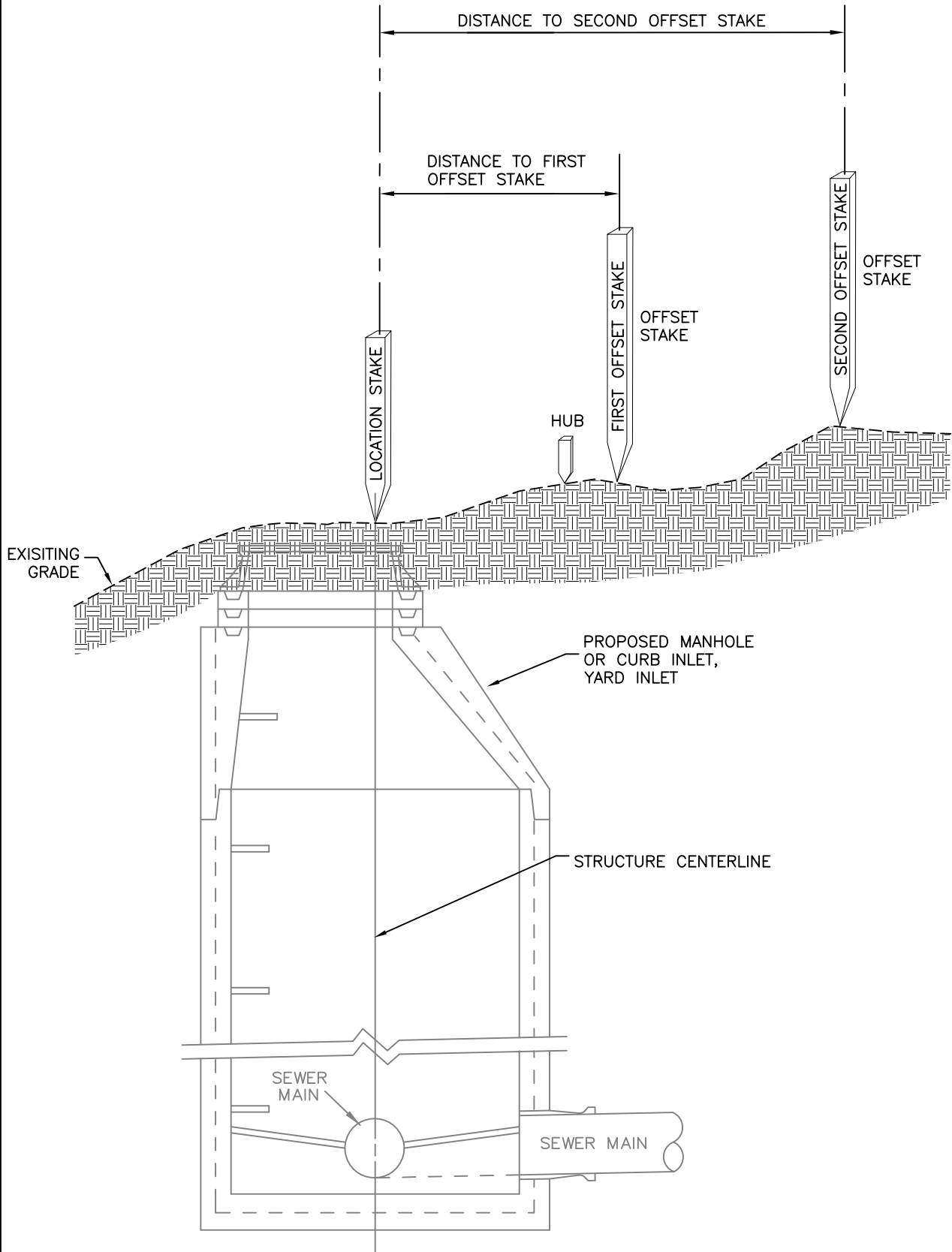
## City of Durham Water and Sewer Standard Details

ID Number	Description
C-1.0	Slope stake for typical street cross-section
C-2.0	Construction stake out for manhole or drainage structures
C-3.0	Construction stake out for fire hydrant
C-4.0	Slope stake out for road subgrade cross-section
C-5.0	Construction stake out for curb and gutter
P-1.0	Roadside pipe trench excavation
P-2.0	Steel pipe encasement for water and sewer mains
P-2.1	Sizing table for steel pipe encasements
P-2.2	Bore and jack installation
P-3.0	Manhole adjustment in paved street
P-4.0	Concrete saddle
P-5.0	Utility easement armoring
P-6.0	Manhole and Valve Box Inserts
W-1.0	Standard tapping sleeve and valve
W-2.0	Fire hydrant installation standard curb and gutter
W-2.1	Fire hydrant installation roll curb and gutter
W-2.2	Fire hydrant installation strip pavement with ditch
W-3.0	Plastic meter box for 5/8" and 1" water meters
W-3.1	3/4" or 1" water connection for 5/8" and 1" water meters
W-3.2	3/4" or 1" water connection for 5/8" and 1" water meters (yoke)
W-3.3	Concrete meter box for 5/8" and 1" water meters
W-4.0	1 1/2" and 2" positive displacement water meter installation
W-4.1	2" compound water meter installation
W-4.2	3", 4", 6" and 8" standard and compound meter installation
W-4.3	4", 6", 8" and 10" fire line meter installation
W-5.0	Single hatch type aluminum door for 1.5" to 3" meter vaults
W-5.1	5' x 5' aluminum access door for 4" to 8" water meter vaults
W-6.0	Water valve box installation for 4", 6", 8", and 12" gate valves
W-6.1	Valve reference table
W-7.0	Water manhole ring and cover
W-8.0	Horizontal thrust blocking isometric views
W-8.1	Concrete thrust block

<b>ID Number</b>	<b>Description</b>
W-8.2	Horizontal thrust blocking schedule
W-9.0	Blow-off assembly for 4", 6", 8", 12" and 16" water mains
W-10.0	Maximum tap sizes for ductile iron pipes
SS-1.0	4" sanitary sewer lateral
SS-1.1	6" sanitary sewer lateral
SS-1.2	Sanitary sewer lateral at manhole
SS-2.0	Precast concrete sanitary sewer manhole
SS-2.1	Precast concrete sanitary sewer manhole notes
SS-2.2	Brick sanitary sewer manhole
SS-2.3	Concrete block sanitary sewer manhole
SS-2.4	Sanitary sewer manhole ring and cover
SS-2.5	Plastic coated sanitary sewer manhole steps
SS-2.6	Sanitary sewer manhole invert
SS-2.7	Sanitary sewer drop manhole
SS-2.8	Sanitary sewer manhole vent
SS-3.0	Doghouse manhole installation over existing sewer main
SS-4.0	Air release valve installation for sewer mains
SS-5.0	PVC pipe backfill
SS-6.0	Sanitary sewer traffic bearing cleanout
SS-7.0	Double sewer line
SS-8.0	Trench cut installation



DESIGN EARTHWORK  
 FILL AREA = \_\_\_\_  
 CUT AREA = \_\_\_\_  
 VF = \_\_\_\_  
 VC = \_\_\_\_



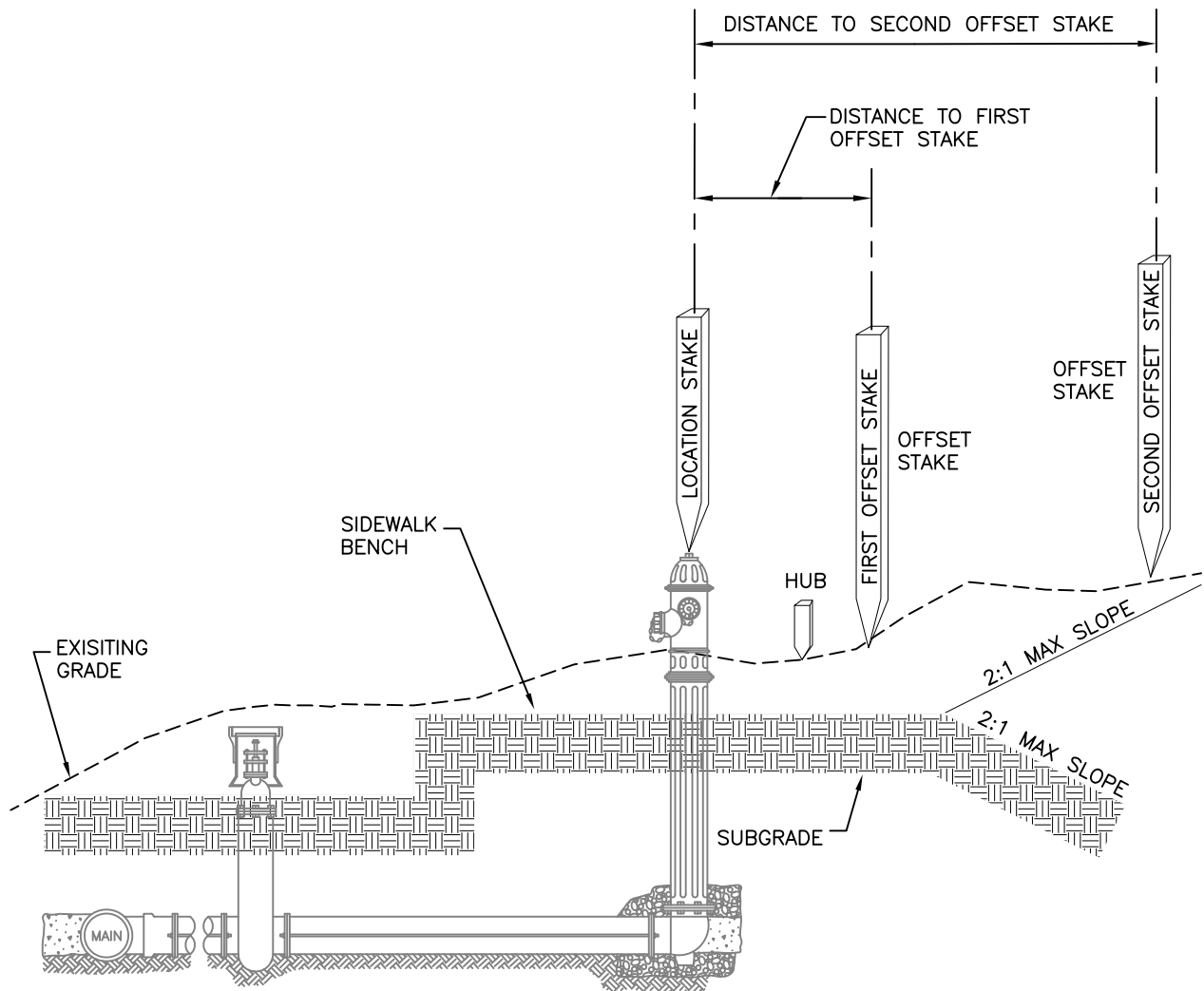
REVISION DATE:  
12/07/2009

## CONSTRUCTION STAKE OUT FOR MANHOLE OR DRAINAGE STRUCTURES

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
C-2.0



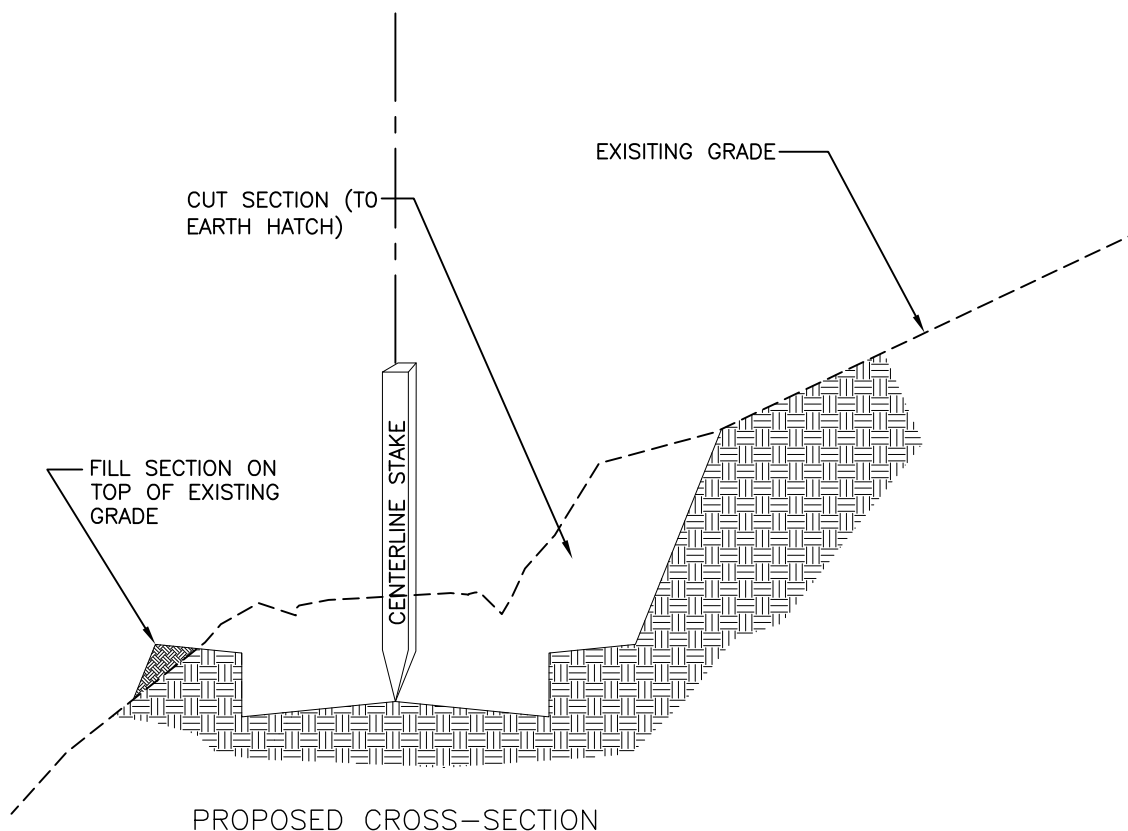
REVISION DATE:  
12/07/2009

## CONSTRUCTION STAKE OUT FOR FIRE HYDRANTS

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
C-3.0



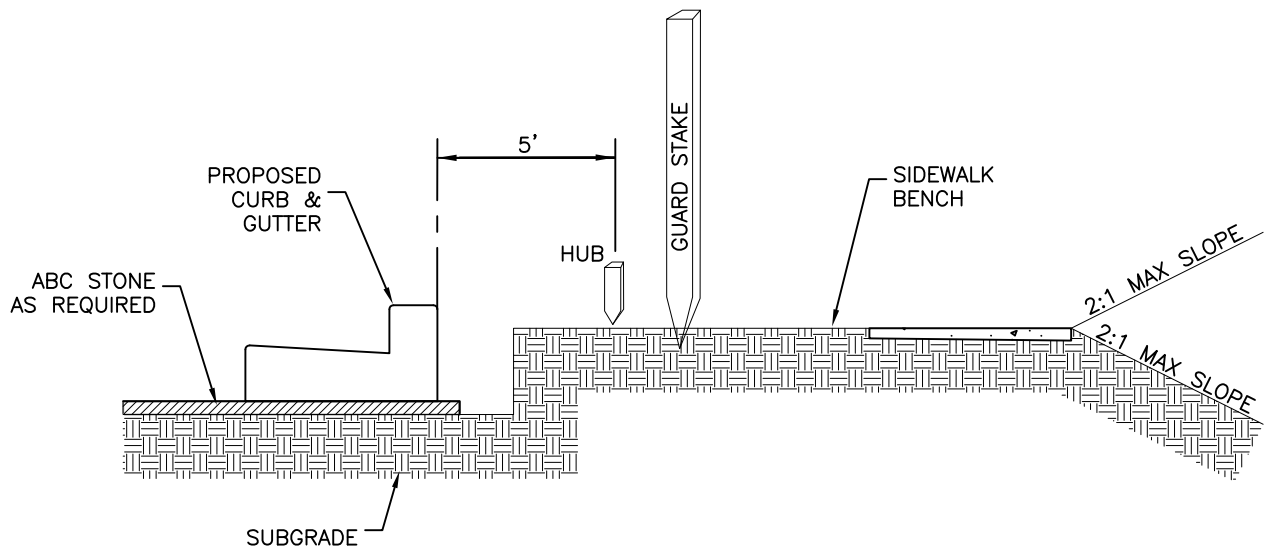
REVISION DATE:  
12/07/2009

## SLOPE STAKE OUT FOR ROAD SUBGRADE CROSS-SECTION

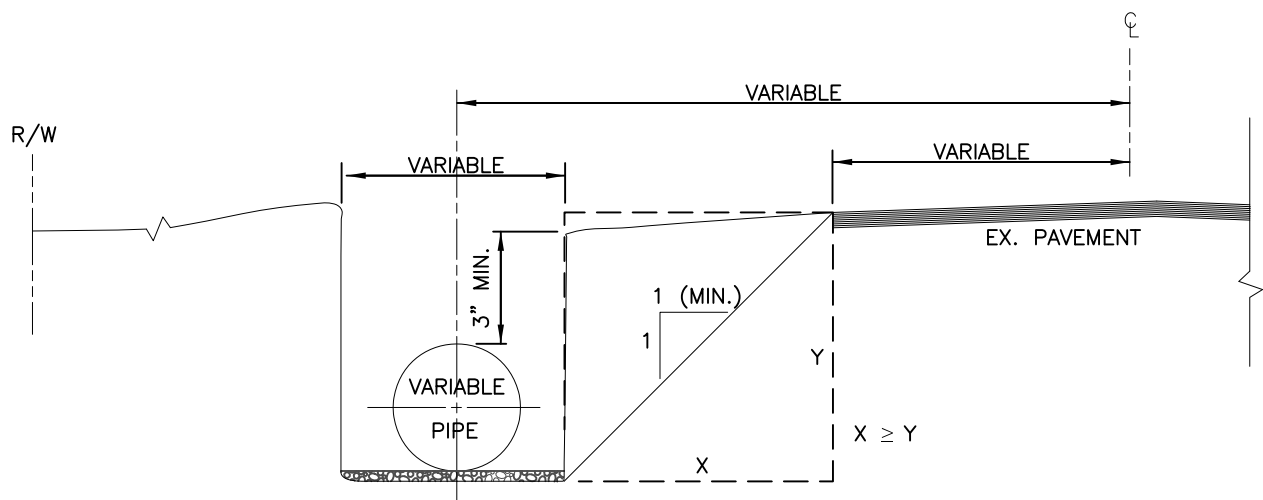
CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
C-4.0

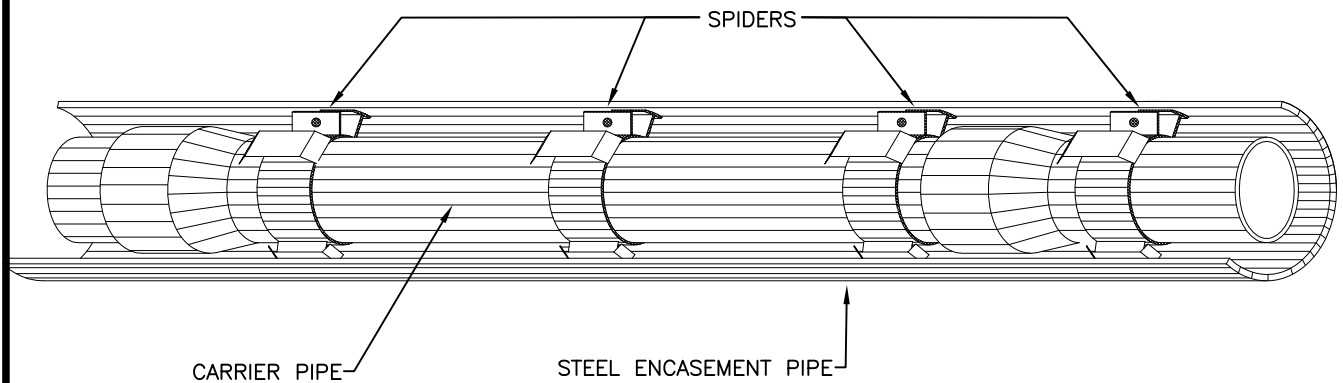






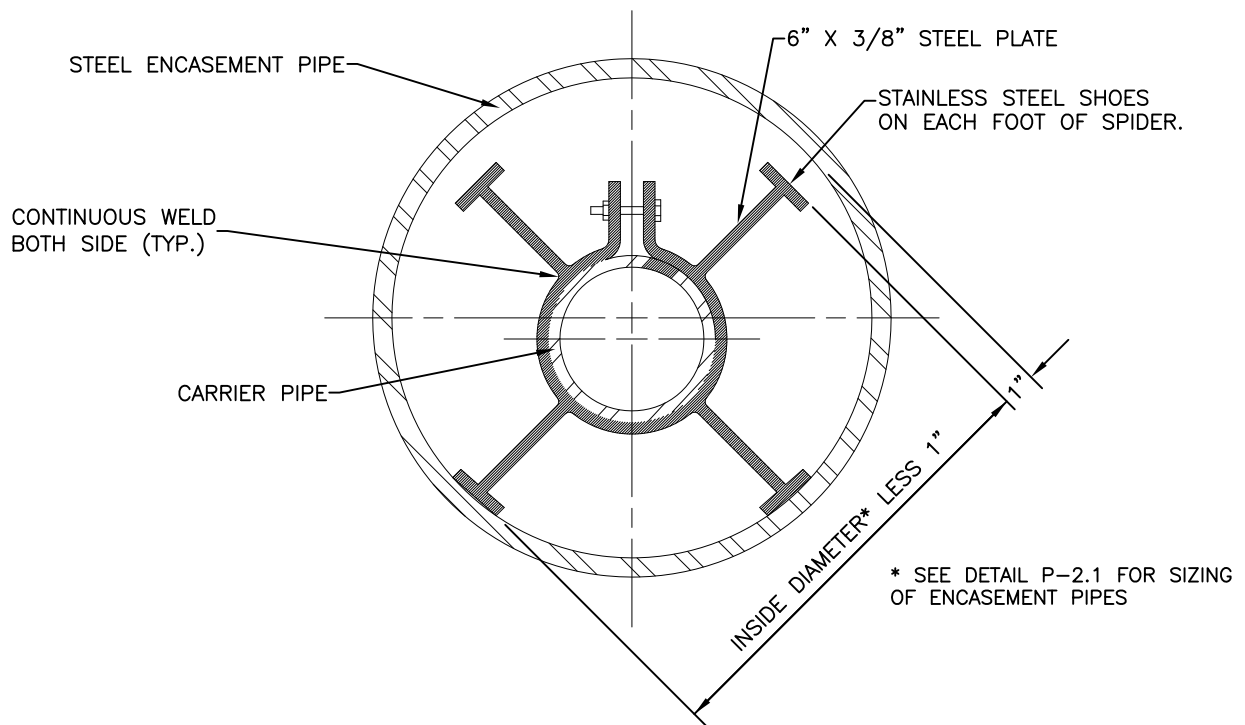
## TYPICAL SECTION

(FOR TRENCH EXCAVATION SHOWING MAXIMUM  
SLOPE RELATIONSHIP FOR PARALLEL INSTALLATION)



NOTES:

1. NORMAL SPACING FOR SPIDERS IS 3 PER 18' LENGTH OF PIPE, ONE SUPPORT AT EACH END AND A SUPPORT AT 9' CENTER.
2. ENTIRE SPIDER ASSEMBLY TO BE BITUMINOUS COATED AFTER FABRICATION.
3. FIELD MODIFY AS REQUIRED TO PROVIDE DESIGN SLOPE IN CARRIER PIPE.
4. SIZING TABLE IN P-2.1



END ELEVATION



REVISION DATE:  
03/18/2010

STEEL PIPE ENCASEMENT FOR  
WATER AND SEWER MAINS

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
P-2.0

## SIZING TABLE FOR CARRIER PIPES AND CASING PIPES

THE FOLLOWING TABLE SUMMARIZES THE REQUIRED SIZES FOR STEEL PIPE ENCASEMENTS:

NOMINAL CARRIER PIPE SIZE (INCHES)	STEEL CASING PIPE SIZE (INCHES)			
	RAILROAD CROSSING		ROAD CROSSING	
	OUTSIDE DIAMETER	WALL THICKNESS	OUTSIDE DIAMETER	WALL THICKNESS
3 AND UNDER	12.75	0.188	6.625	0.250
4	12.75	0.188	8.625	0.250
6	12.75	0.188	12.75	0.250
8	16	0.219	16	0.250
10	20	0.281	20	0.250
12	24	0.312	24	0.250
14	28	0.375	28	0.312
16	30	0.406	30	0.312
18	36	0.469	36	0.375
20	42	0.562	42	0.500
24	42	0.562	42	0.500

NOTE: NCDOT AND THE RAILROADS MAY HAVE DIFFERENT REQUIREMENTS.



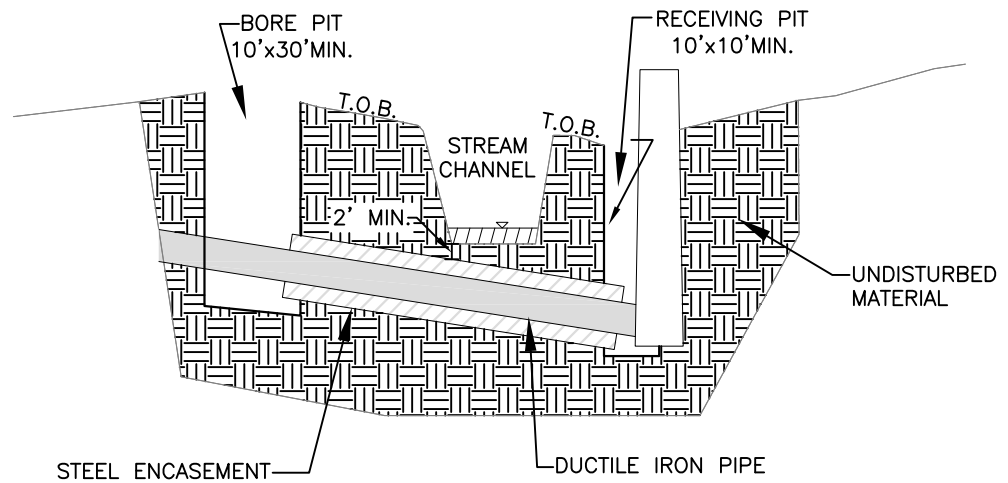
REVISION DATE:  
12/07/2009

### SIZING TABLE FOR STEEL PIPE ENCASEMENTS

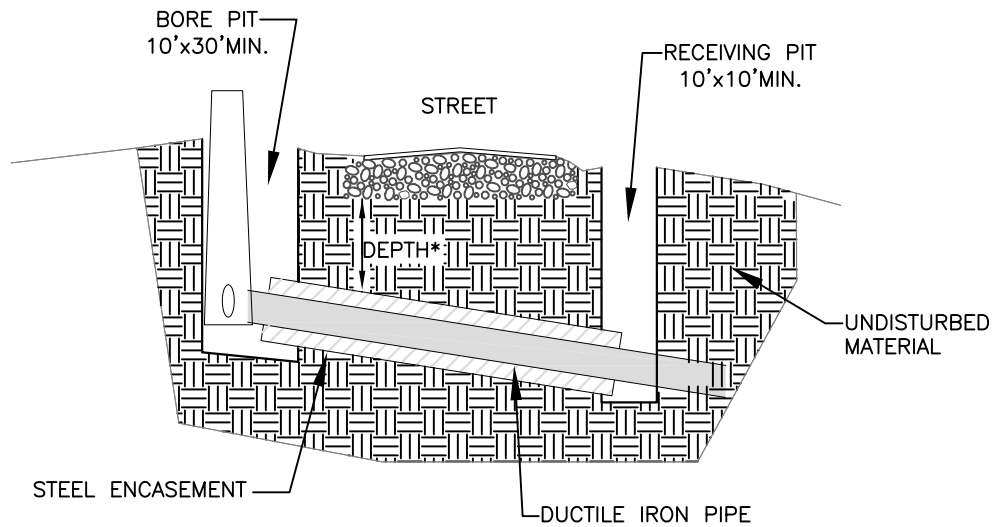
CITY OF DURHAM, NORTH CAROLINA  
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SCALE:  
NTS

DETAIL NO.  
P-2.1

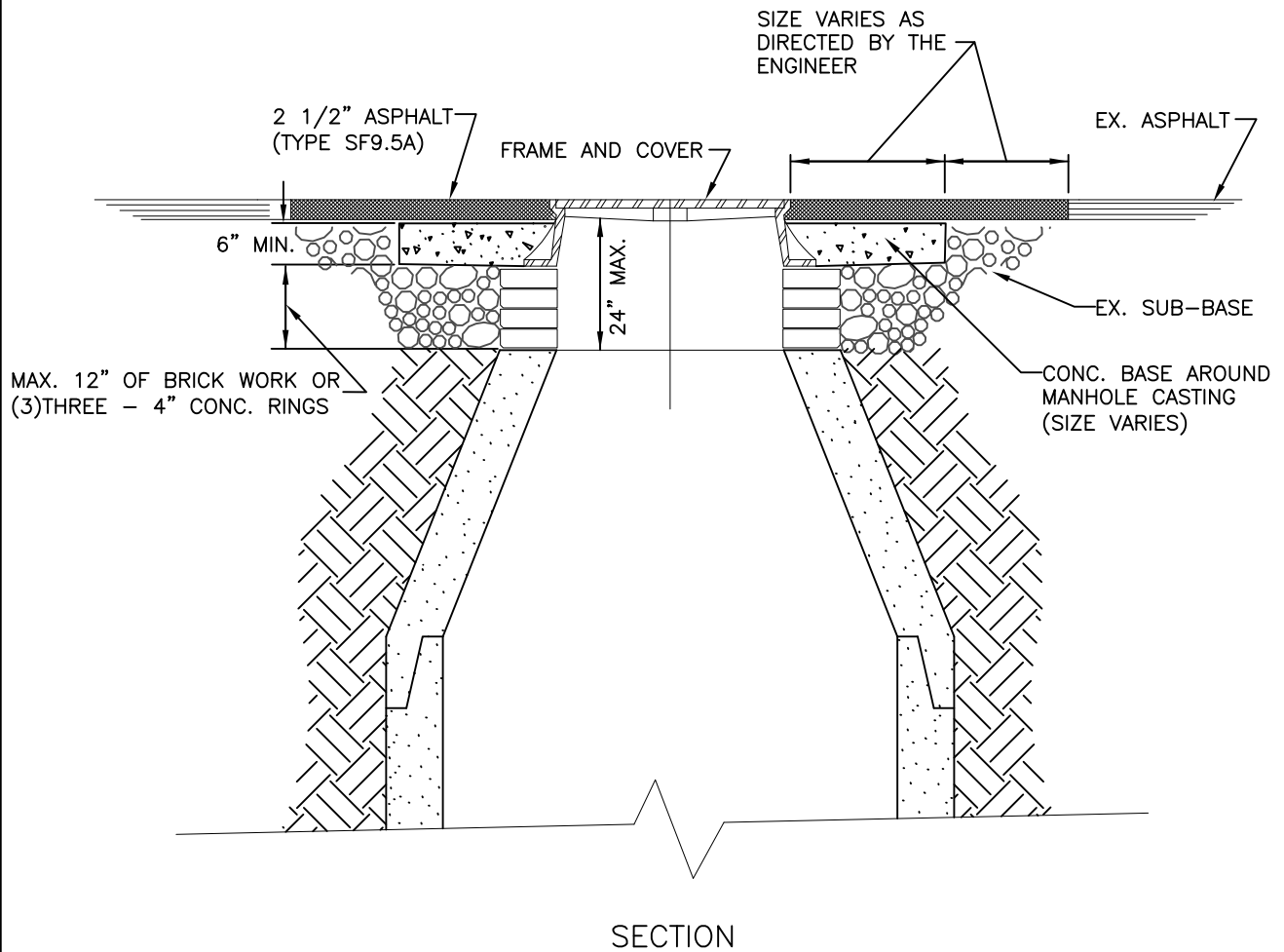


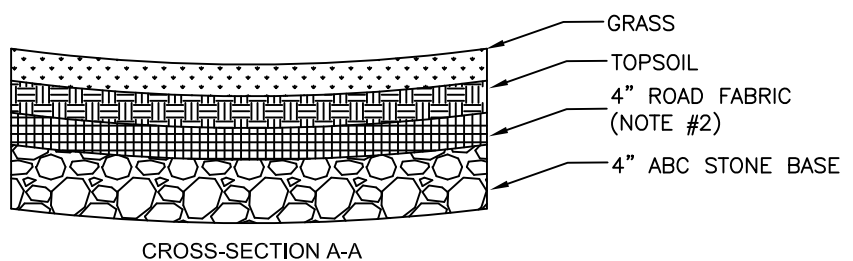
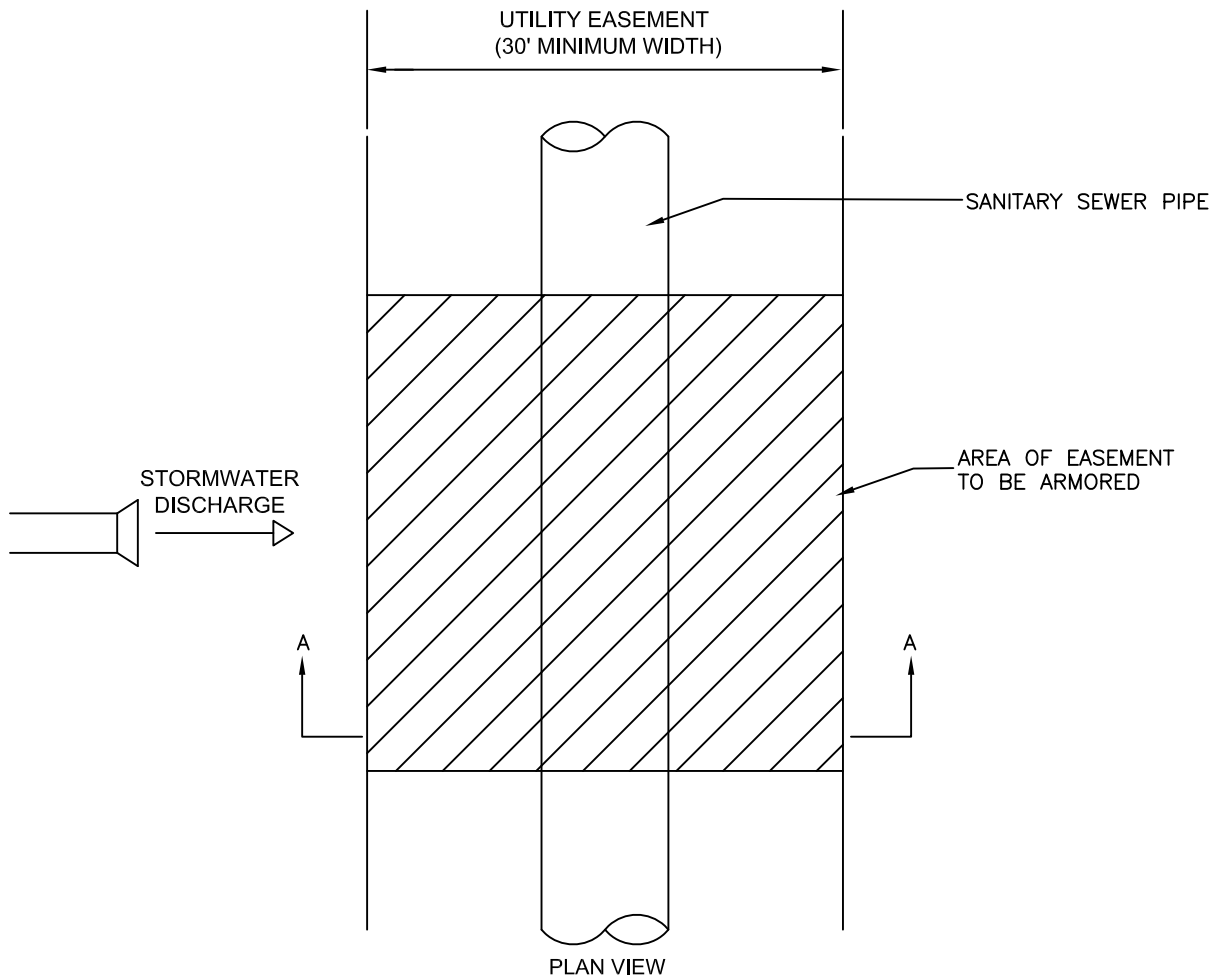
## STREAM CROSSING BORE AND JACK



\*DEPTH AS NECESSARY TO MEET MINIMUM COVER AND/OR  
MINIMUM UTILITY SEPARATION REQUIREMENTS

## STREET CROSSING BORE AND JACK





NOTES:

1. THE ARMOR FOR THE EASEMENT SHALL BE WIDE ENOUGH TO ENCOMPASS THE ENTIRE FLOW ACROSS THE EASEMENT.
2. PROVIDE MIRAFI X-SERIES WOVEN POLYPROPYLENE GEOTEXTILES (500X PRODUCT) ROAD FABRIC OR APPROVED EQUAL.
3. ARMOR FOR THE EASEMENT SHALL BE INSTALLED EVEN IF LEVEL SPREADERS ARE INSTALLED FOR THE STORM DRAINAGE DISCHARGE.



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## UTILITY EASEMENT ARMORING

CITY OF DURHAM, NORTH CAROLINA  
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SCALE:  
NTS

DETAIL NO.  
P-5.0

## NOTES

1. IN ALL MANHOLES, SEWER AND WATER, REGARDLESS OF LOCATION, ULTRA HDPE INSERTS, WITH POLYPROPYLENE HANDLES, ARE TO BE INSTALLED. ADDITIONALLY, ALL OC BOXES AT WATER VALVES, HDPE INSERTS ARE TO BE INSTALLED.
2. THE INSERTS SHALL BE MANUFACTURED OF HDPE, MEETING THE STANDARDS OF ASTM D-1248, CLASS A, CATEGORY 5, TYPE III. THE MINIMUM UNIFORM THICKNESS SHALL BE  $\frac{1}{8}$ ". THERE SHALL BE A POLYETHYLENE OR POLYPROPYLENE REMOVAL STRAP, RIVETED TO THE STRAP. VENTILATION CAN BE BY EITHER A VENT HOLE OR A VALVE, LOCATED ON THE SIDE OF THE BOWL. THE VENT WILL LIMIT 24 HOUR INFLOW TO 5 GALLONS. PROPER DIMENSIONS OF THE MANHOLE FRAME AND COVER MUST BE SUPPLIED TO THE INSERT MANUFACTURERS, TO DETERMINE THE EXACT MODEL OF INSERT NEEDED. ACCEPTABLE MANUFACTURERS/STYLES SHALL BE: (1) PARSONS ENVIRONMENTAL PRODUCTS, INC., [WWW.PARSONSENVIRONMENTAL.COM](http://WWW.PARSONSENVIRONMENTAL.COM), READING, PA. (2) NOFLOW INFLOW, DOUG MEADOWS CO., [WWW.NOFLOWINFLOW.COM](http://WWW.NOFLOWINFLOW.COM), ABILENE, TX.

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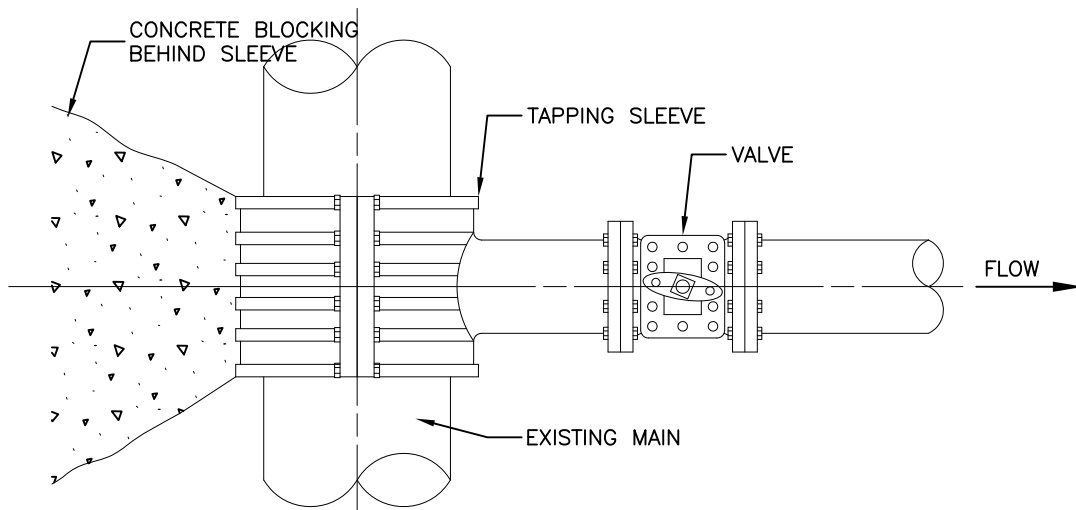
REVISION DATE:  
9/24/2010

### MANHOLE AND VALVE BOX INSERTS

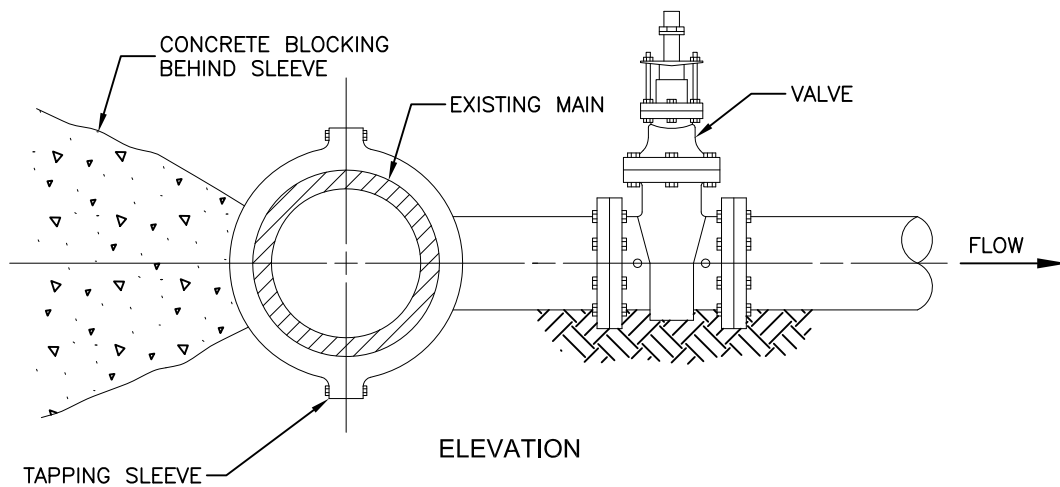
CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
P-6.0



PLAN



ELEVATION

GENERAL NOTES:

1. 3000 P.S.I. SOLID CONCRETE BLOCKING BEHIND SLEEVE.
2. CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OF MECHANICAL JOINT FITTINGS.
3. 12" X 12" AND 16" X 16" TAPPING SLEEVE IS NOT ALLOWED.

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REVISION DATE:  
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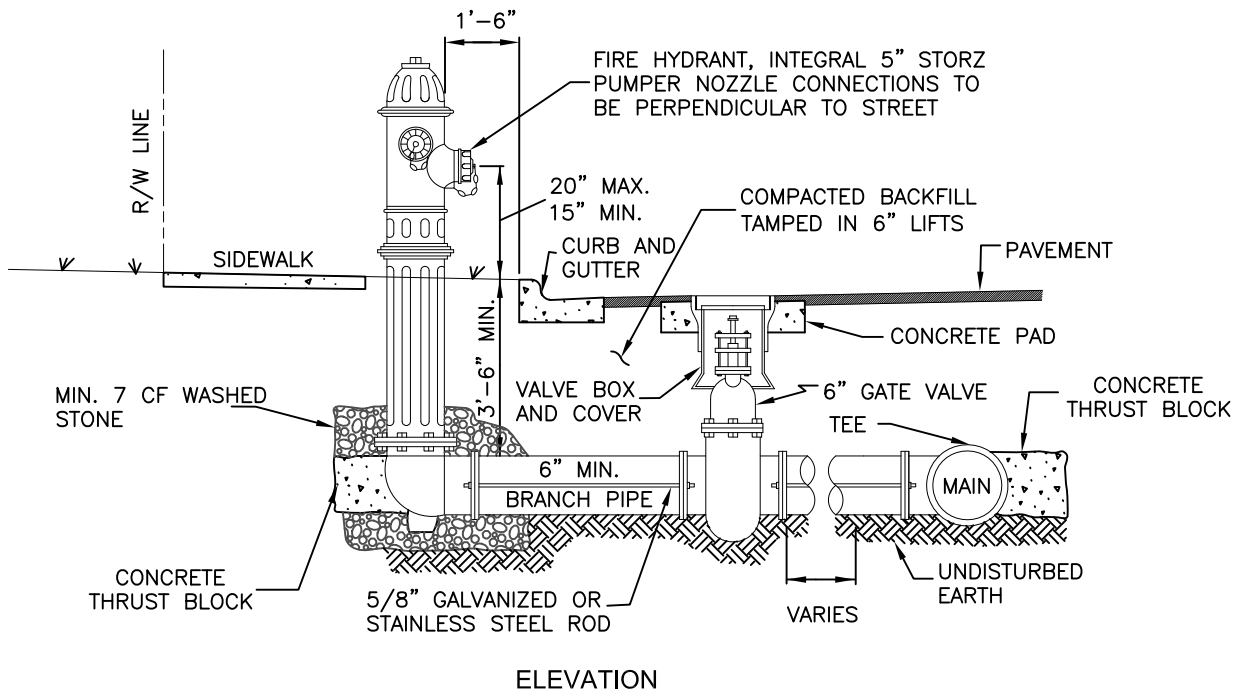
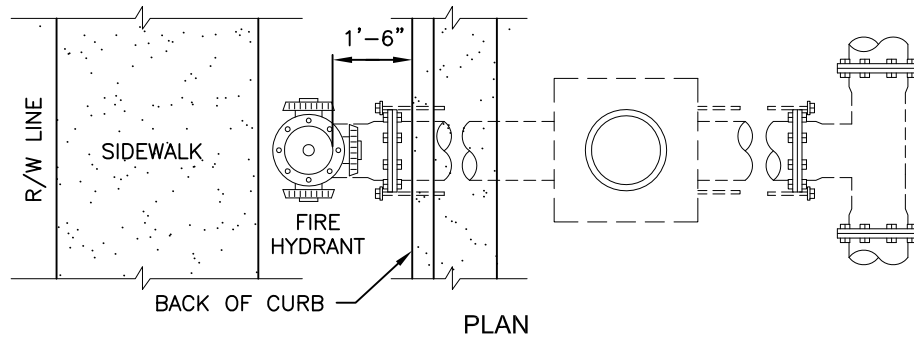
## STANDARD TAPPING SLEEVE AND VALVE ASSEMBLY

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
W-1.0





GENERAL NOTES:

1. ALL CONCRETE BLOCKING SHALL BE 3000 P.S.I. MINIMUM.
2. ALL HYDRANT VALVES SHALL BE RODDED TO MAIN LINE.
3. CONCRETE PAD REQUIRED ON ALL VALVES. (DETAIL NO. W-6.0).
4. HYDRANT TO BE LOCATED 10' FROM P.T. OR P.C. AT INTERSECTIONS.
5. THE HYDRANT PUMPER NOZZLE SHALL BE OF ONE-PIECE DESIGN,
6. THE NOZZLE SHALL BE AN INTEGRAL PART OF THE FIRE HYDRANT AND MUST BE FURNISHED BY THE MANUFACTURER OR AUTHORIZED DISTRIBUTOR. ADAPTERS WILL NOT BE ACCEPTED.
7. ALL FIRE HYDRANTS ARE TO BE PAINTED NATIONAL STANDARD "SAFETY RED".

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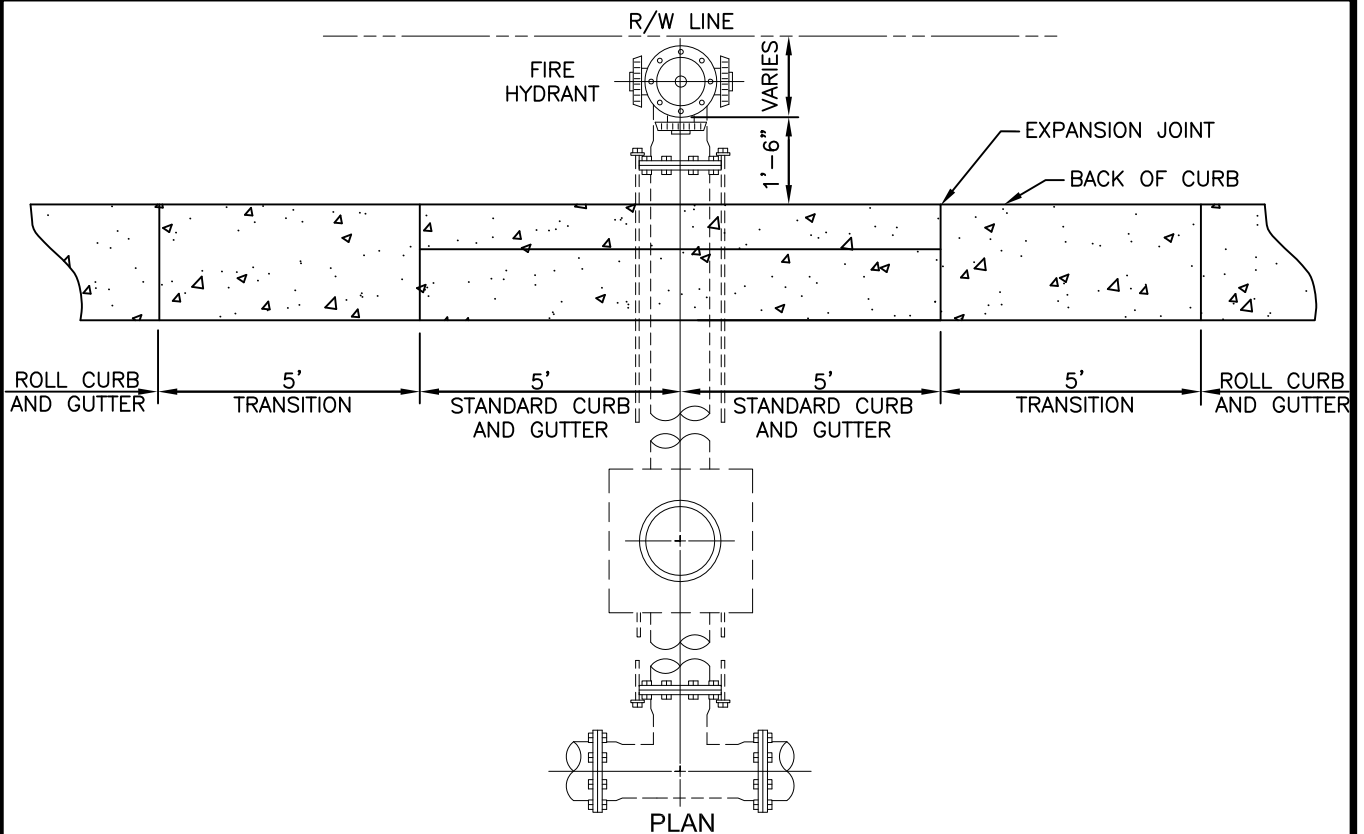
REVISION DATE:  
09/24/2010

## FIRE HYDRANT INSTALLATION STANDARD CURB AND GUTTER

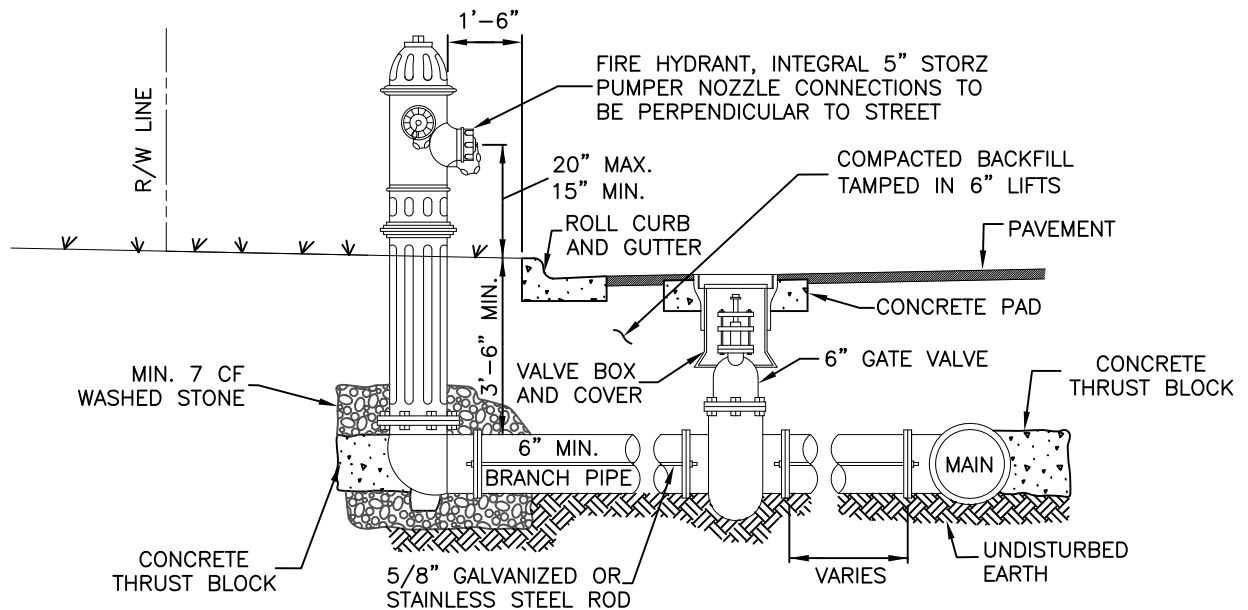
CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
W-2.0



TRANSITION FROM ROLL CURB AND GUTTER TO STANDARD CURB AND GUTTER IN FRONT OF FIRE HYDRANT



GENERAL NOTES:

1. ALL CONCRETE BLOCKING SHALL BE 3000 P.S.I. MINIMUM.
2. ALL HYDRANT VALVES SHALL BE RODDED TO MAIN LINE.
3. CONCRETE PAD REQUIRED ON ALL VALVES (DETAIL NO. W-6.0).
4. HYDRANT TO BE LOCATED 10' FROM P.T. OR P.C. AT INTERSECTIONS.
5. ALL FIRE HYDRANTS ARE TO BE PAINTED NATIONAL STANDARD "SAFETY RED".



REVISION DATE:  
09/24/2010

## FIRE HYDRANT INSTALLATION ROLL CURB AND GUTTER

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
W-2.1

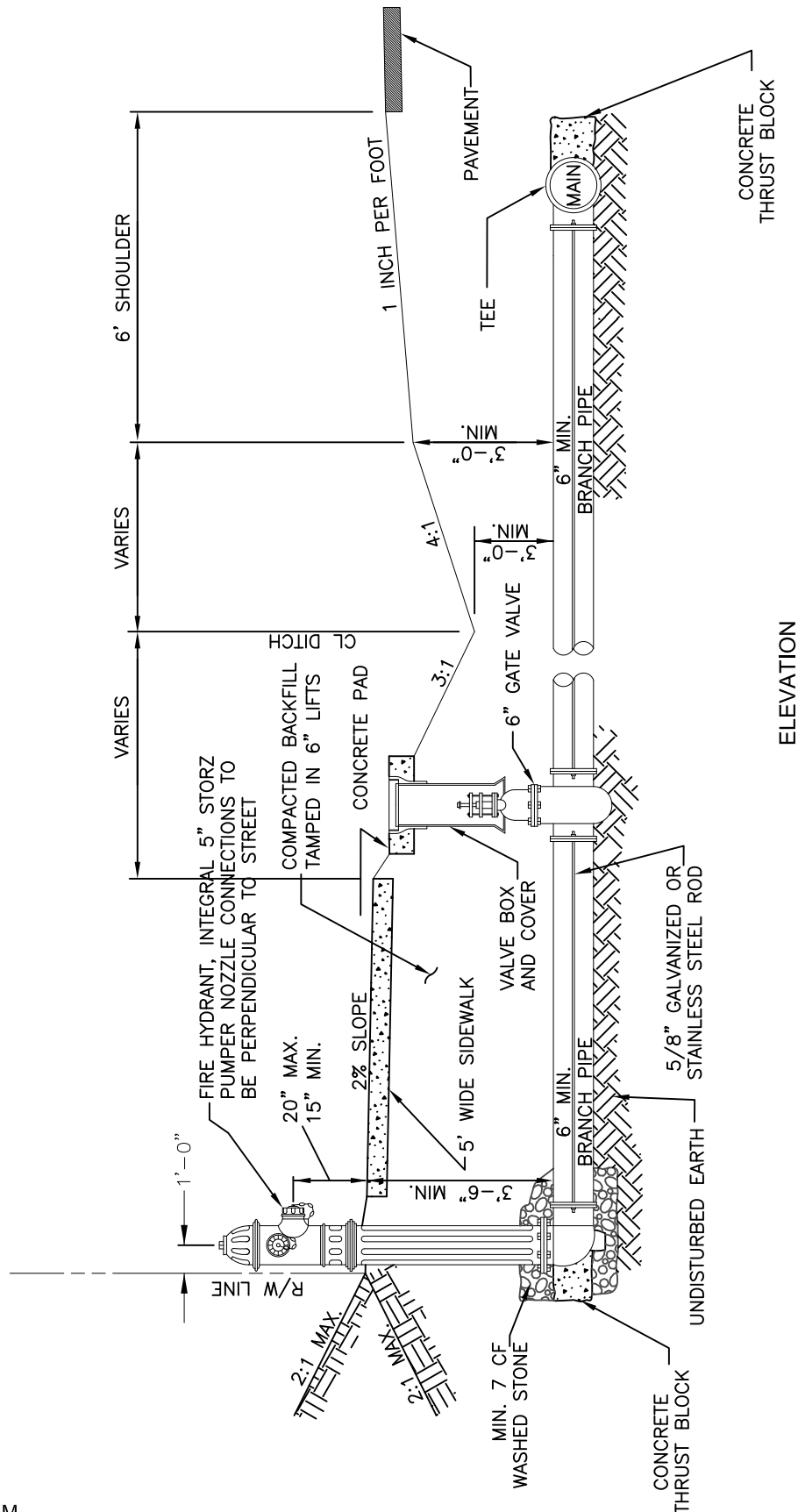
REVISION DATE:  
09/24/10

## FIRE HYDRANT INSTALLATION STRIP PAVEMENT WITH DITCH

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
W-2.2

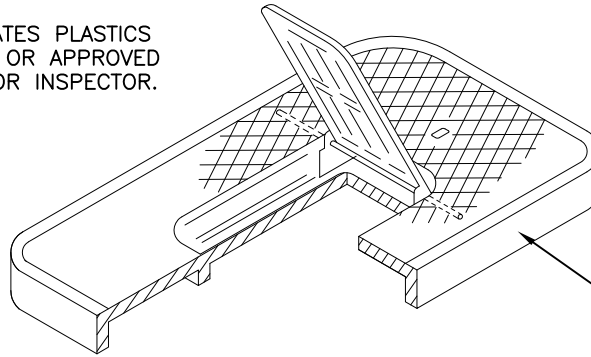


### GENERAL NOTES:

1. ALL CONCRETE BLOCKING SHALL BE 3000 P.S.I. MINIMUM.
2. ALL HYDRANT VALVES SHALL BE RODDED TO MAIN LINE.
3. CONCRETE PAD REQUIRED ON ALL VALVES (DETAIL NO. W-6.0).
4. HYDRANT TO BE LOCATED 10' FROM P.T. OR P.C. AT INTERSECTIONS.
5. ALL FIRE HYDRANTS ARE TO BE PAINTED NATIONAL STANDARD "SAFETY RED".

NOTE:  
THE METER BOX SHALL BE MID-STATES PLASTICS  
MSBCF1118-12, MSBCF1118-18XL, OR APPROVED  
EQUAL AS DIRECTED BY ENGINEER OR INSPECTOR.

NO. 33. T — DUCTILE IRON COVER  
WITH DUCTILE IRON HINGE LID  
WEIGHT 18LBS.



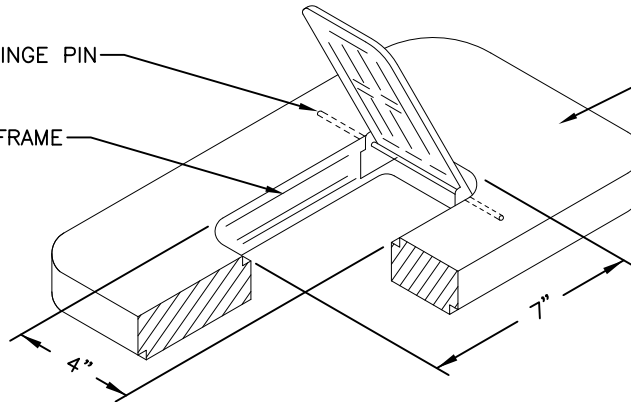
AS DIRECTED BY  
ENGINEER OR  
INSPECTOR.

BRASS HINGE PIN

FLANGE FRAME

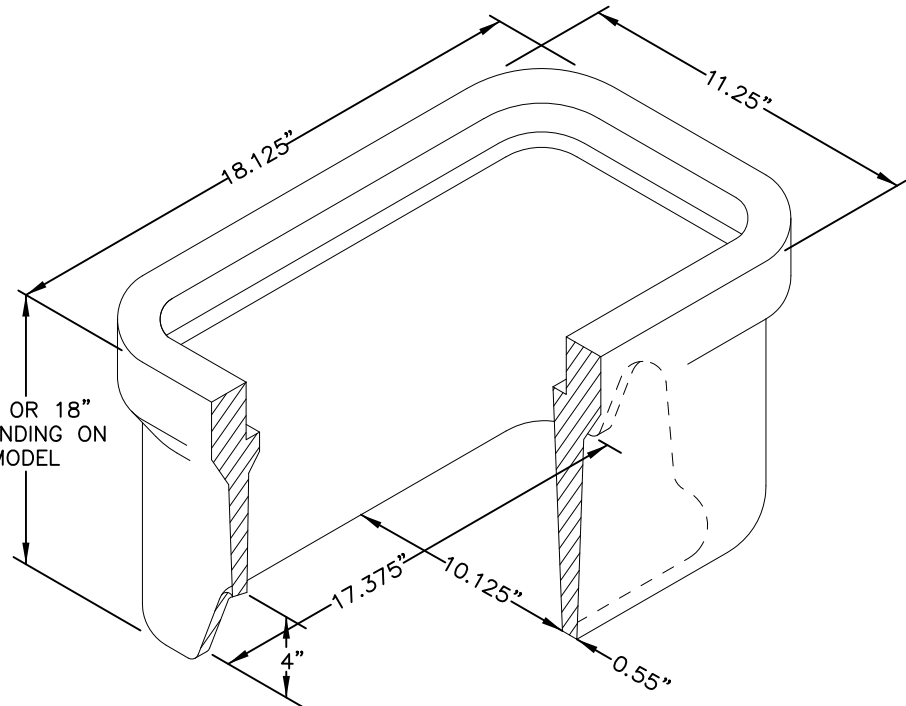
FOR USE IN  
RESIDENTIAL AREA.

NO. 33. H — PLASTIC COVER  
WITH PLASTIC HINGE LID  
WEIGHT 8LBS.



NO. 33. — PLASTIC BODY  
WEIGHT 15LBS. OR 19.5LBS.  
DEPENDING ON MODEL

12" OR 18"  
DEPENDING ON  
MODEL



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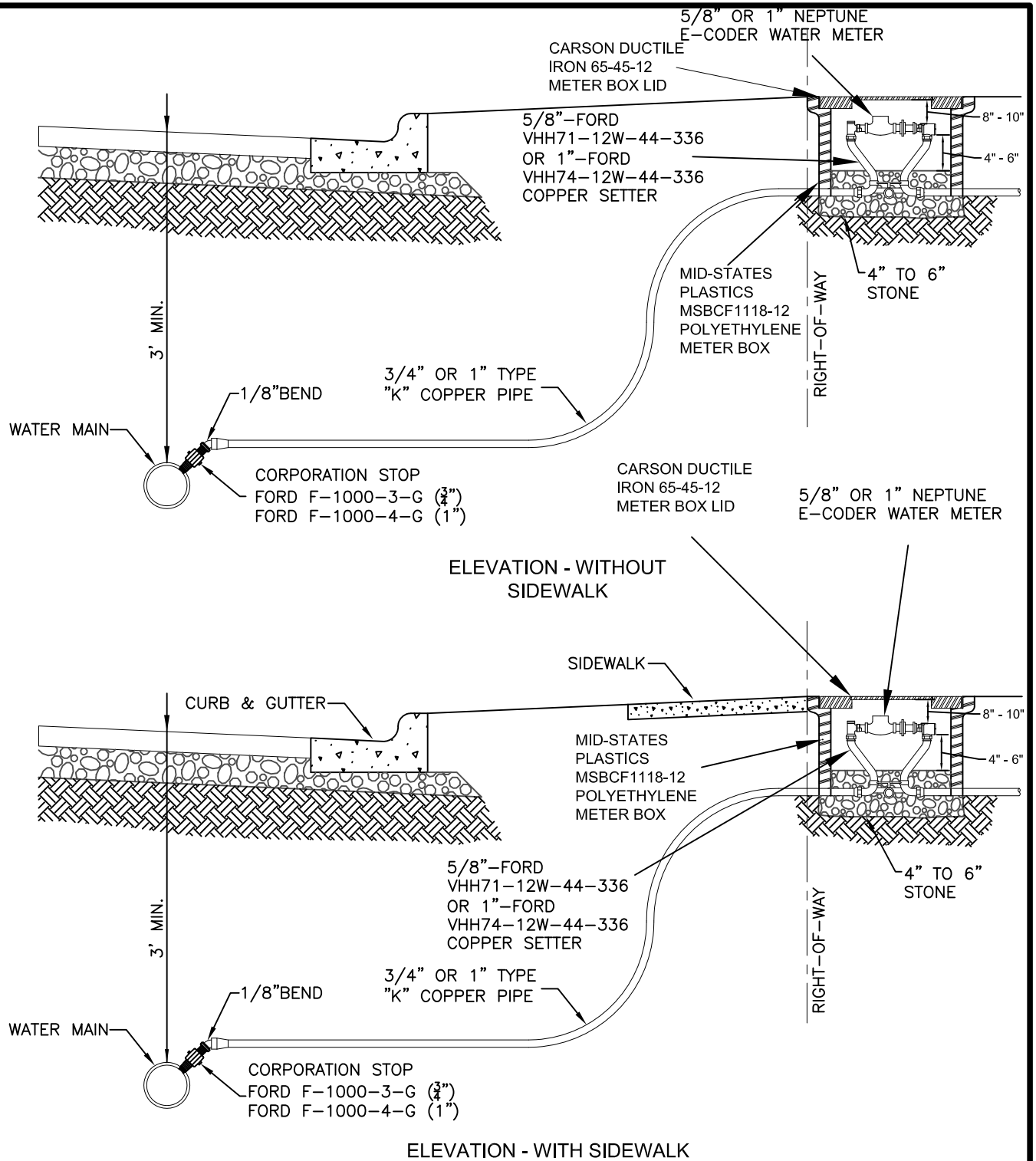
REVISION DATE:  
12/07/2009

## PLASTIC METER BOX FOR 5/8" AND 1" WATER METERS

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
W-3.0



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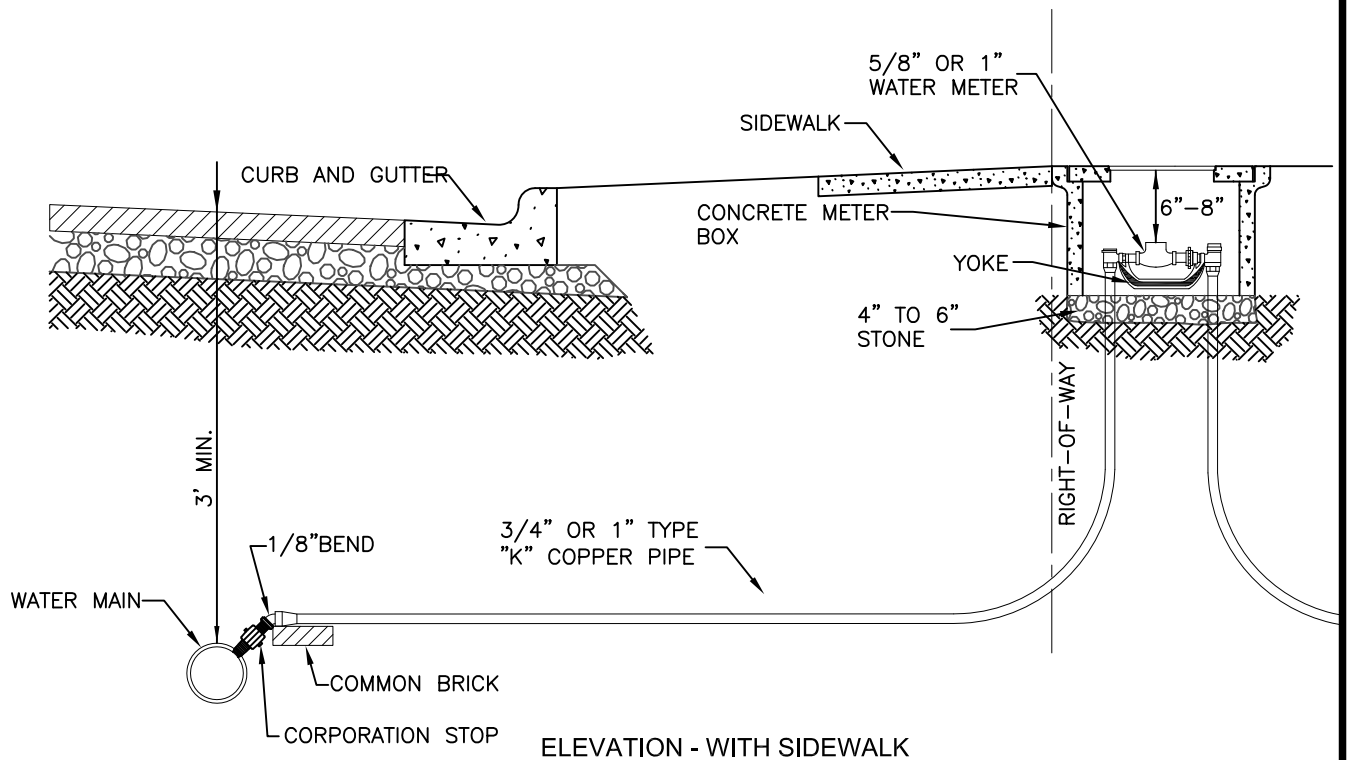
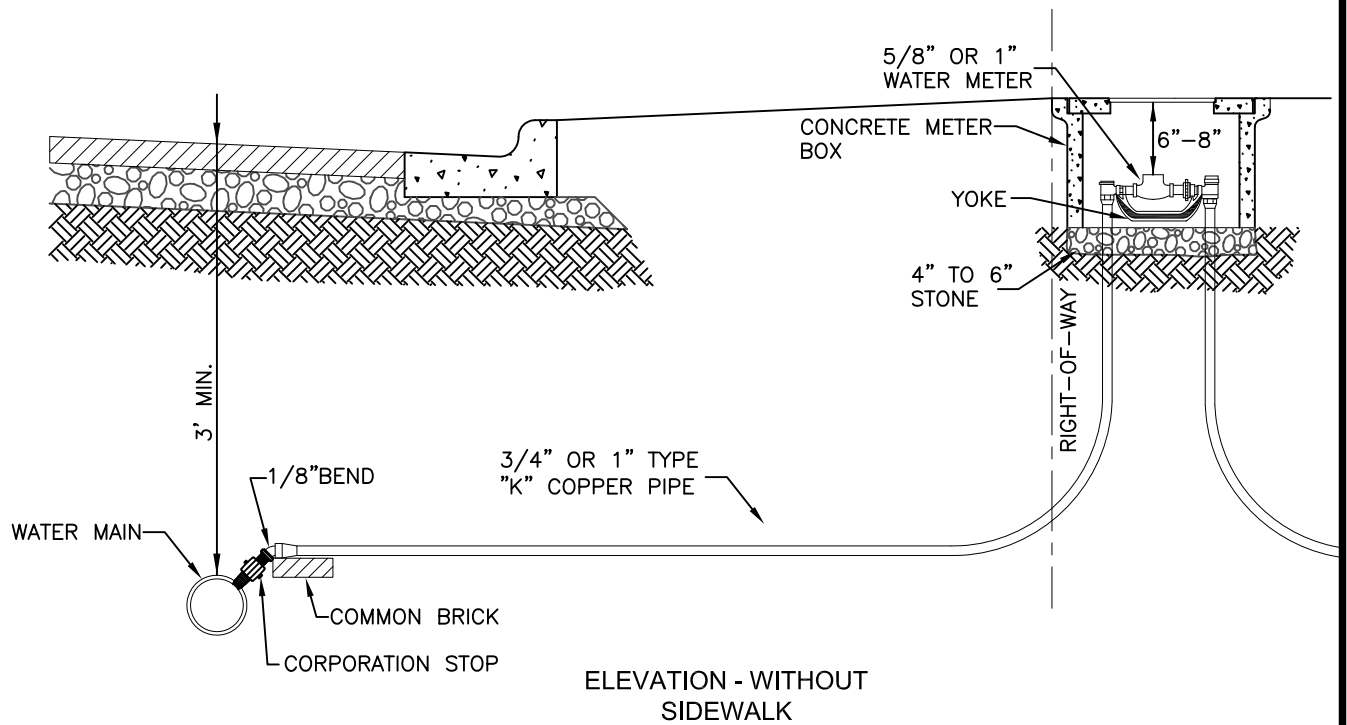
REVISION DATE:  
12/07/09

## 3/4" OR 1" WATER CONNECTION FOR 5/8" OR 1" WATER METERS

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NONE

DETAIL NO.  
W-3.1



NOTES:

1. FLARED FITTINGS REQUIRED. NO COMPRESSED OR PLASTIC FITTING ALLOWED.
2. YOKES WILL BE DISCONTINUED AS OF JULY 1, 2010



REVISION DATE:  
12/07/2009

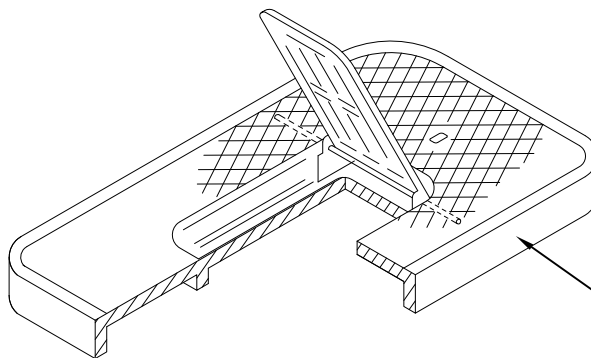
## 3/4" OR 1" WATER CONNECTION FOR 5/8" OR 1" WATER METERS (YOKE)

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

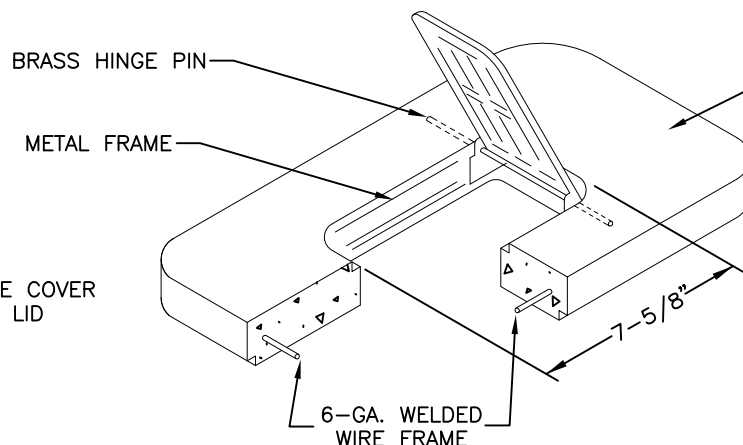
DETAIL NO.  
W-3.2

NO. 33. T — CAST IRON COVER  
WITH METAL HINGE LID  
WEIGHT 18LBS.



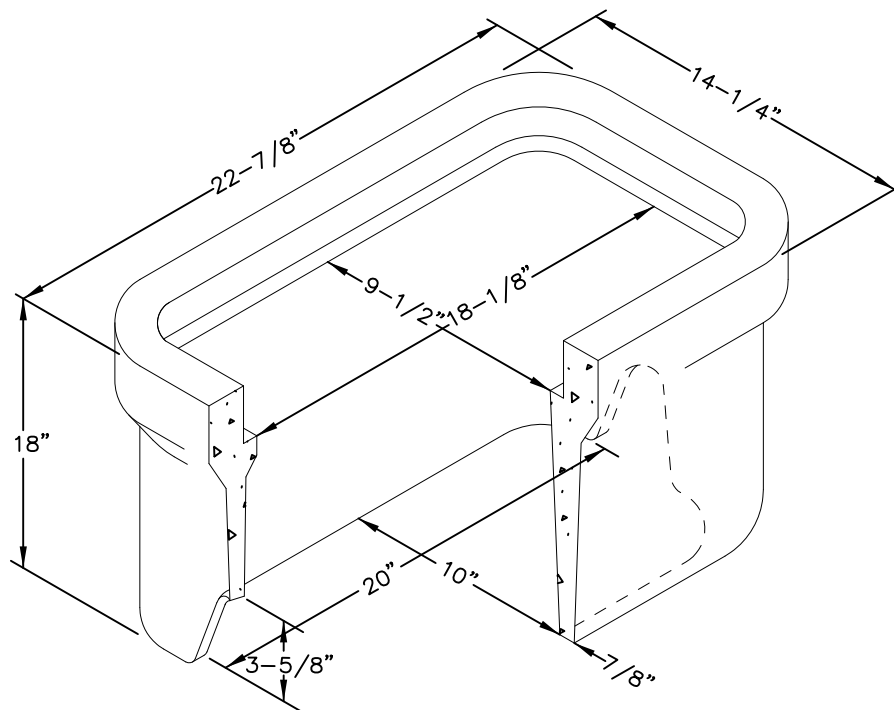
AS DIRECTED BY  
ENGINEER OR  
INSPECTOR.

NO. 33. H — CONCRETE COVER  
WITH METAL HINGE LID  
WEIGHT 30LBS.



FOR USE IN  
RESIDENTIAL AREA.

NO. 33. — CONCRETE BODY  
WEIGHT 72LBS.



NOTE:

1. CONCRETE METER BOXES ARE TO BE DISCONTINUED AS OF JULY 1 2010.



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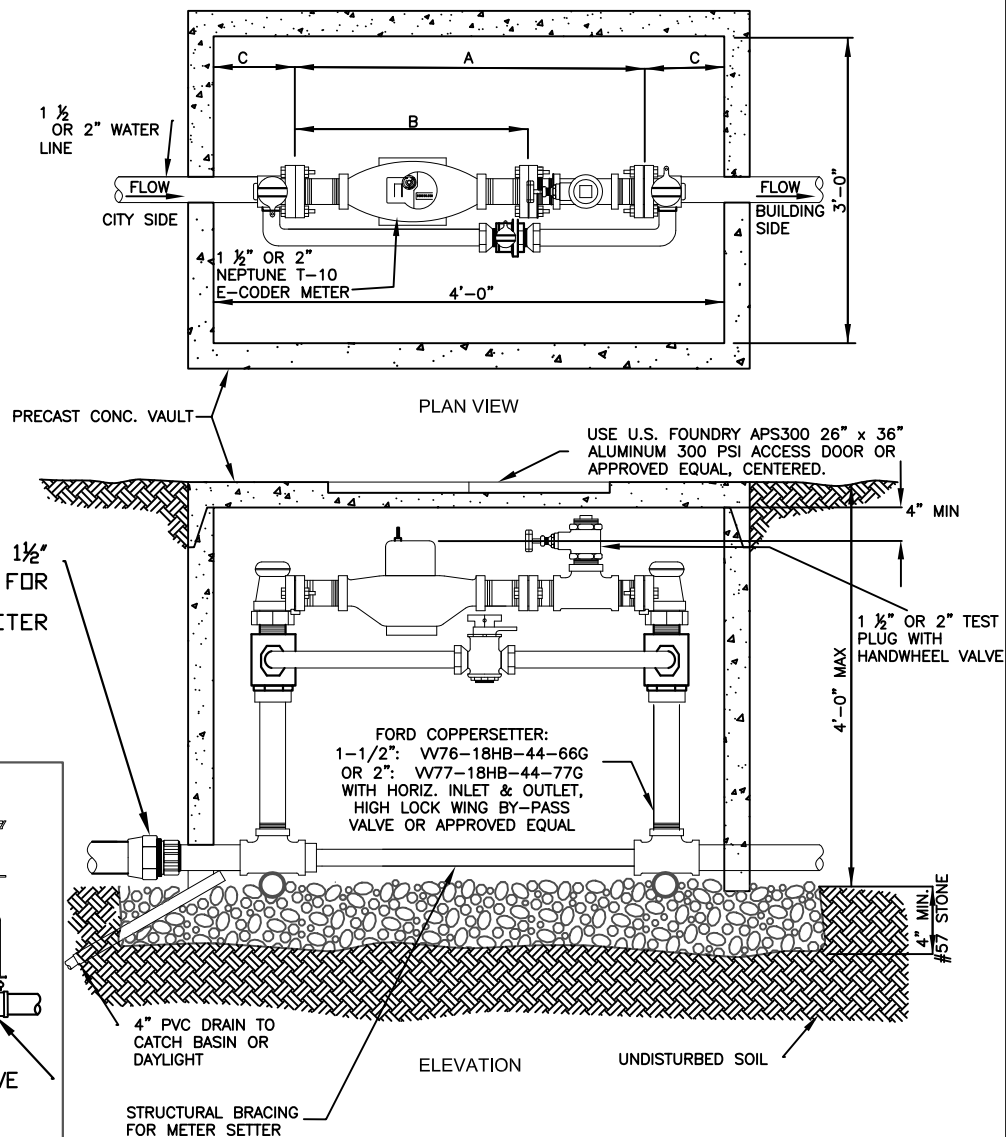
## CONCRETE METER BOX FOR 5/8" AND 1" WATER METERS

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
W-3.3

DIMENSIONS			
METER SIZE	A	B	C
1 1/2"	23 1/2"	13"	12 1/4"
2"	24"	17"	12"



EXPLODED VIEW 2"  
TAP & 2" GATE  
VALVE



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## 1 1/2" & 2" POSITIVE DISPLACEMENT WATER METER INSTALLATION

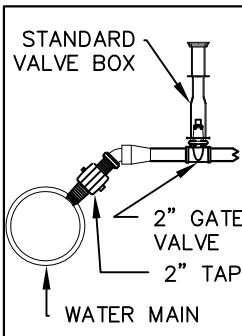
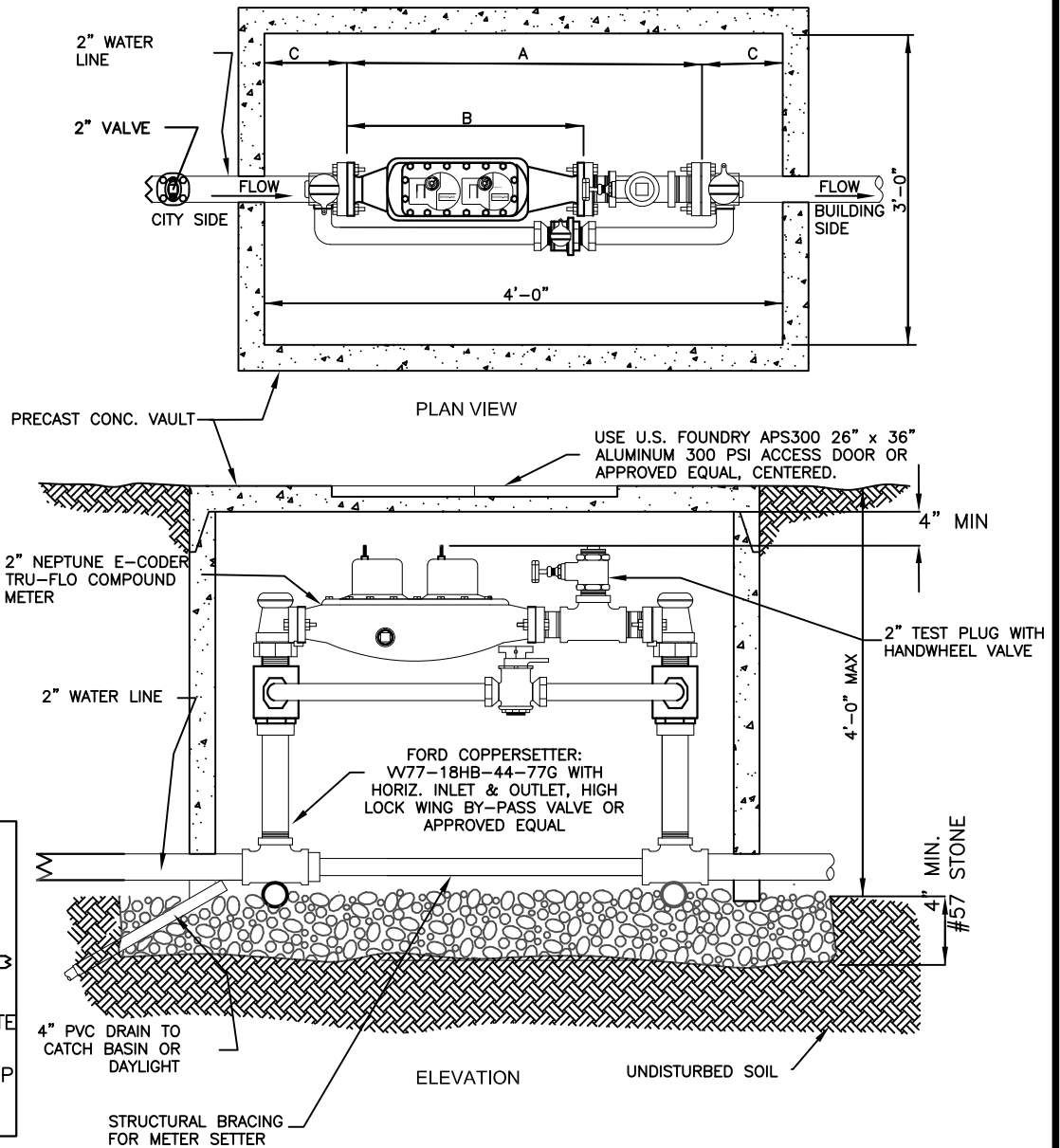
CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NONE

DETAIL NO.  
W-4.0



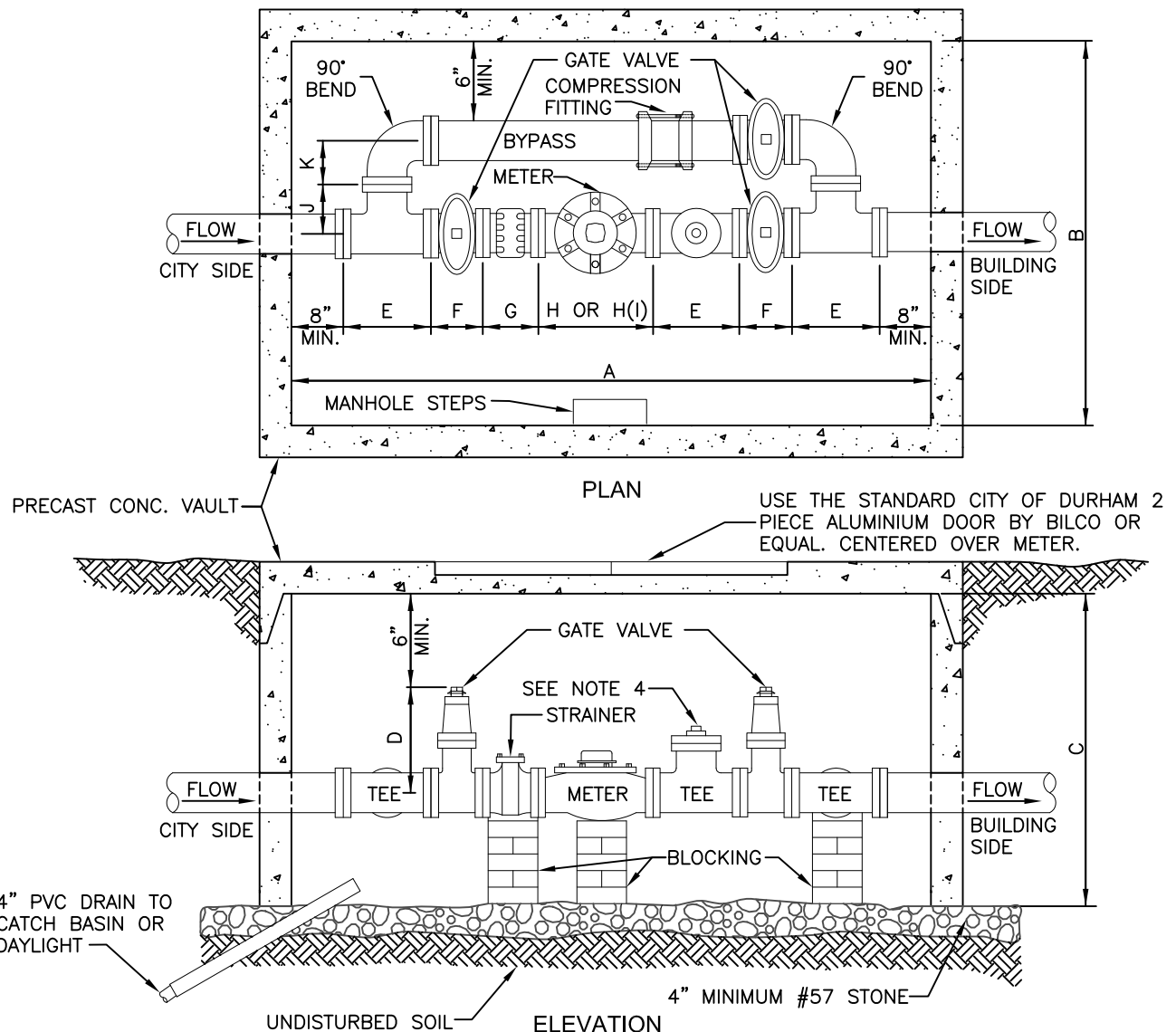
DIMENSIONS			
	A	B	C
2"	23 1/2"	15 1/2"	12 1/4"



EXPLODED VIEW 2"  
TAP & 2" GATE  
VALVE

## 2" COMPOUND WATER METER INSTALLATION

DIMENSIONS											
METER SIZE	A	B	C	D	E	F	G	H	H(I)	J	K
3"	8'-6"	4'-6"	3'-4"	12 3/8"	11"	8"	6"	12"	17"	5 1/2"	5 1/2"
4"	10'-0"	6'-0"	4'-0"	14 3/16"	13"	9"	7 1/2"	14"	20"	6 1/2"	6 1/2"
6"	10'-0"	6'-0"	4'-6"	18"	16"	10 1/2"	9"	18"	24"	8"	8"
8"	12'-0"	6'-0"	21 1/2"	2'-10"	18"	11 1/2"	10"	20"	55 3/8"	9"	9"



#### GENERAL NOTES:

1. PIPES, BENDS, TEES, AND GATE VALVES ARE THE SAME SIZE AS THE METER SIZE. (I.E. 6" METER HAS 6" PIPE, 6" 90° BENDS, 6"x6" TEES AND 6" GATE VALVES.)
2. ALL DIMENSIONS ARE BASED UPON STANDARD SIZES FOR PIPES, BENDS, TEES, GATE VALVES AND METERS. STRAINER SIZES VARY DEPENDING ON MANUFACTURER. DIMENSION "G" IS BASED UPON NEPTUNE STRAINERS. IF ANOTHER MANUFACTURER IS BEING USED THIS DIMENSION WILL VARY AND THE METER INSTALLATION MAY NOT FIT INTO THE VAULT BOX SHOWN. THIS SHOULD BE CHECKED BEFORE ORDERING THE VAULT BOX. COORDINATE WITH CITY OF DURHAM WATER & SEWER MAINTENANCE DIVISION.
3. DIMENSION "H" IS FOR STANDARD METERS. DIMENSION "H(I)" IS FOR COMPOUND METERS.
4. USE APPROPRIATE SIZE PLATE FLANGE ON THE TEE WITH A 2" BRONZE TAPPING PLUG.
5. USE ONLY METERS, STRAINERS AND GATE VALVES APPROVED BY THE CITY OF DURHAM, SEE SPECIFICATIONS.
6. FOR 3" METER VAULTS USE THE STANDARD SINGLE HATCH-TYPE ALUMINIUM DOOR, CENTERED OVER THE METER. FOR 4", 6" AND 8" METER VAULTS USE 5'X5' STANDARD CITY OF DURHAM ACCESS DOORS. (SEE DETAIL NO. W-5.0 OR W-5.1).

DURHAM



1 8 6 9  
CITY OF MEDICINE

REVISION DATE:  
12/07/2009

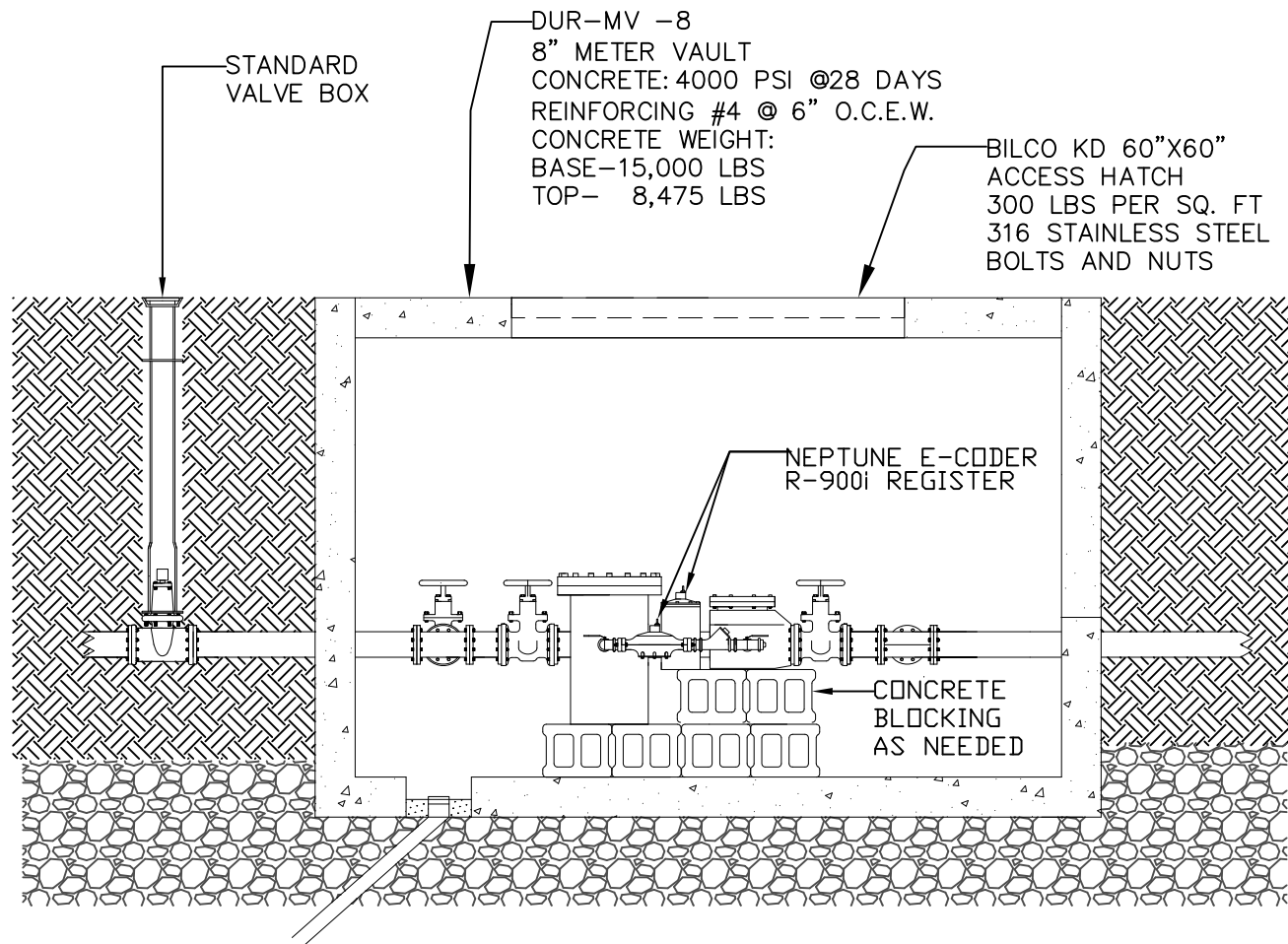
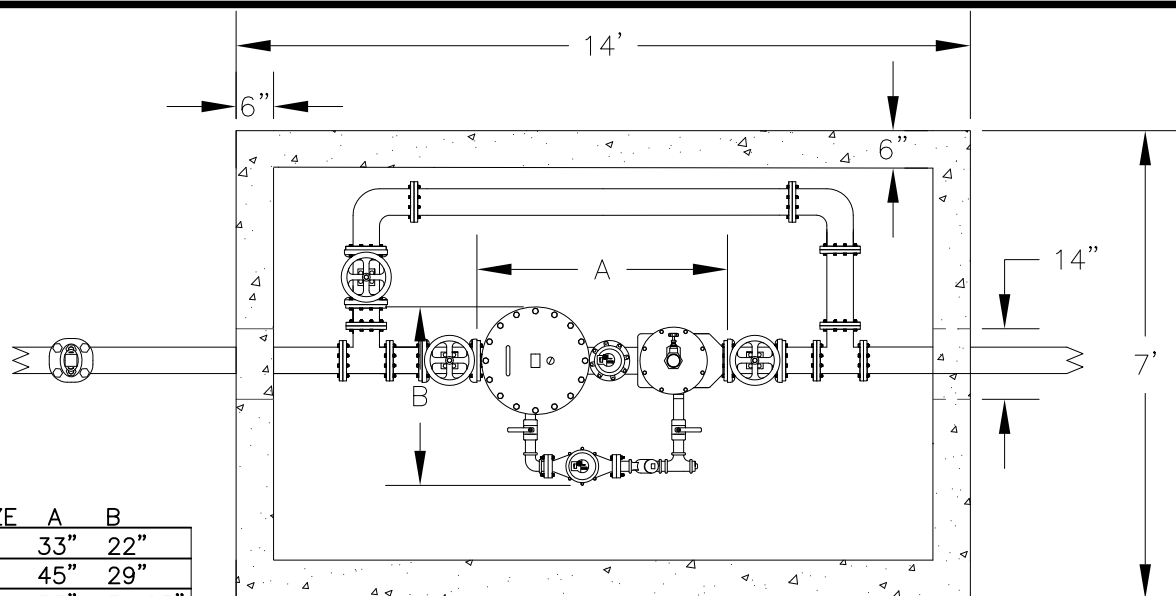
## 3", 4", 6", 8" STND. AND COMPOUND WATER METER INSTALLATION

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
W-4.2

SIZE	A	B
4"	33"	22"
6"	45"	29"
8"	53"	34.25"
10"	68"	36.25"



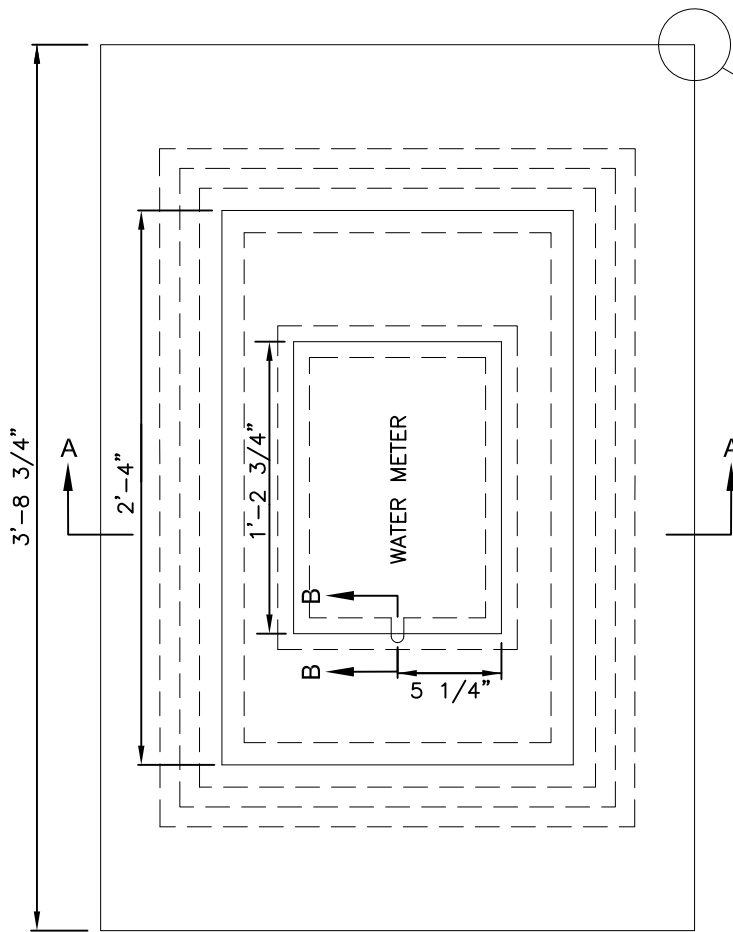
REVISION DATE:  
12/07/2009

## FIRELINE METER AND METER VAULT 4", 6", 8", & 10" METERS

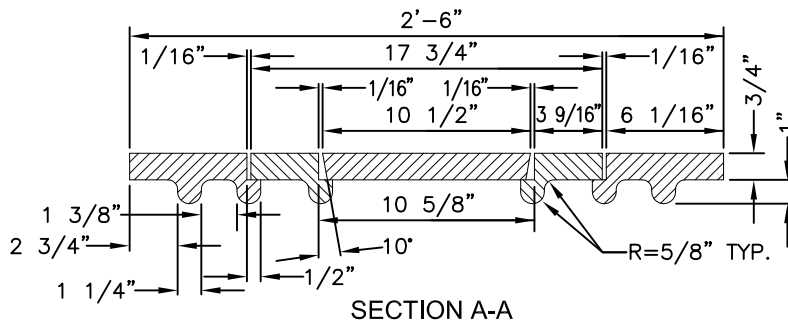
CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NONE

DETAIL NO.  
W-4.3



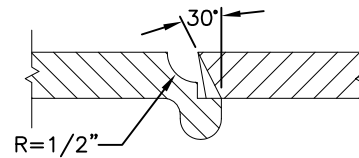
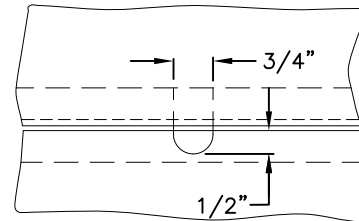
**PLAN**



**SECTION A-A**

**NOTE:**

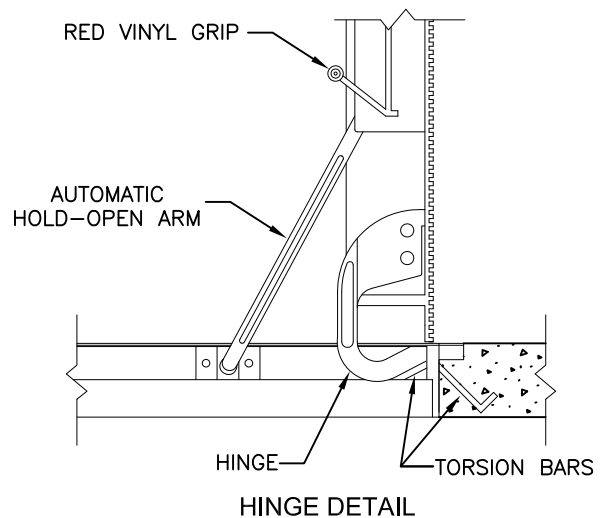
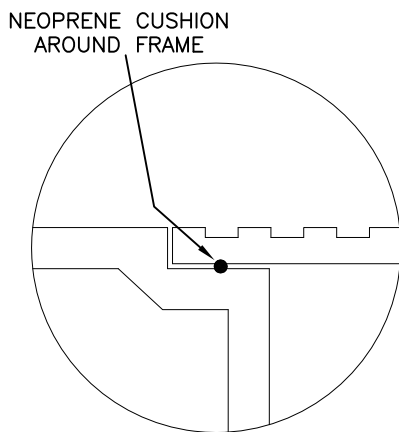
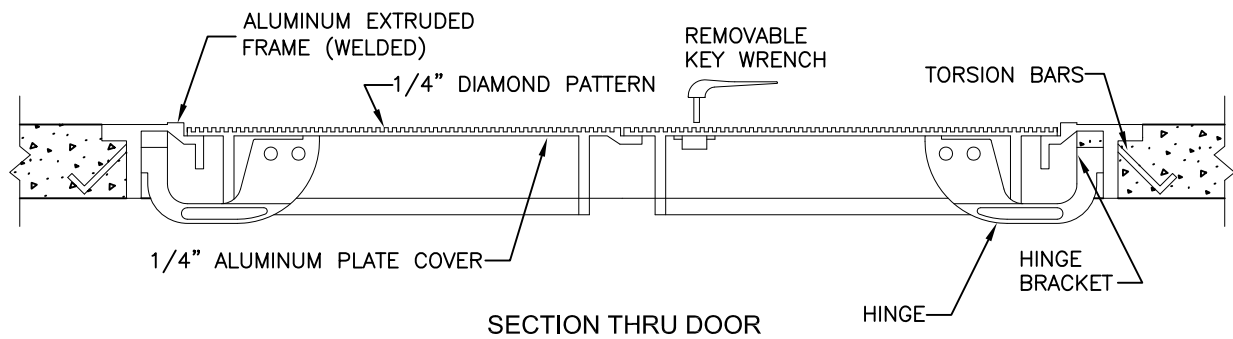
1. DIAMOND PATTERN: 1/4" X 1/2"
2. UPPER CASTING SURFACE TO HAVE DIAMOND PATTERN RAISED 1/8".



**SECTION B-B**

**NOTE:**

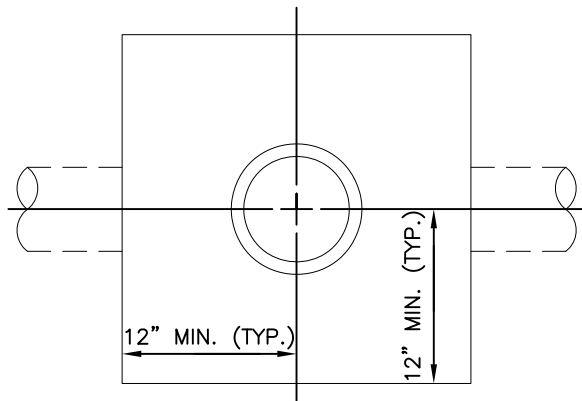
1. FOR 1 1/2", 2", & 3" METERS.
2. 300 P.S.F. LOADING



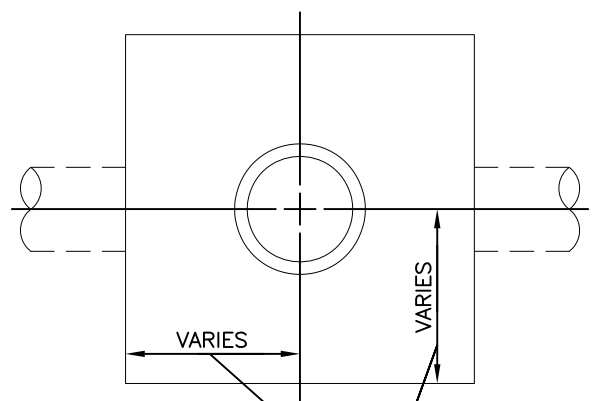
NOTES:

1. ACCESS DOOR SHALL BE A TYPE KD-4 MANUFACTURED BY THE BILCO COMPANY, NEW HAVEN, CONN. OR APPROVED EQUAL.
2. FRAME SHALL BE 1/4" EXTRUDED ALUMINUM WITH BUILT-IN NEOPRENE CUSHION AND WITH STRAP ANCHORS BOLTED TO EXTERIOR.
3. DOOR LEAF SHALL BE 1/4" ALUMINUM DIAMOND PLATE REINFORCED WITH ALUMINUM STIFFNERS AS REQUIRED.
4. CAST STEEL HINGES SHALL BE BOLTED TO UNDERSIDE AND PIVOT ON TORSION BARS THAT COUNTERBALANCE THE DOOR FOR EASY OPERATION.
5. THE DOOR SHALL OPEN 90° AND LOCK AUTOMATICALLY IN THAT POSITION.
6. A VINYL GRIP HANDLE SHALL BE PROVIDED TO RELEASE AND CLOSE THE COVER WITH ONE HAND.
7. DOORS SHALL BE BUILT TO WITHSTAND A LIVE LOAD OF 150 POUNDS PER SQUARE FOOT, AND EQUIPPED WITH A SNAP LOCK AND REMOVABLE HANDLE.
8. FACTORY FINISH SHALL BE ALUMINUM LACQUER, AND BITUMINOUS COATING SHALL BE APPLIED TO THE EXTERIOR FRAME BY THE MANUFACTURER.

NOTE: FOR 4", 6", AND 8" METERS

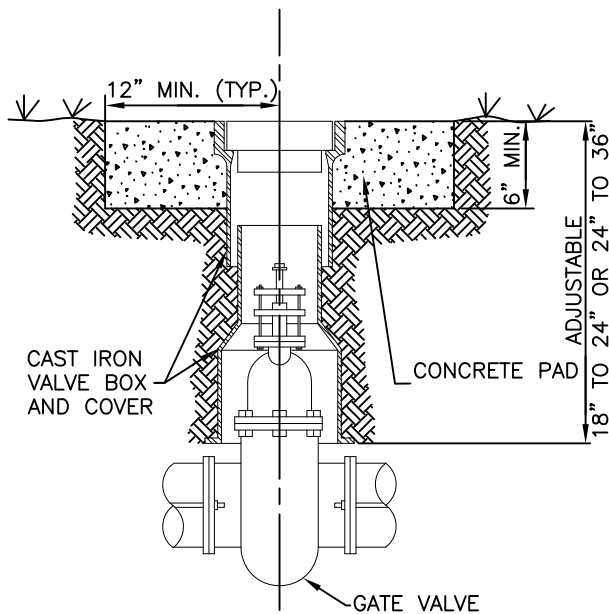


PLAN

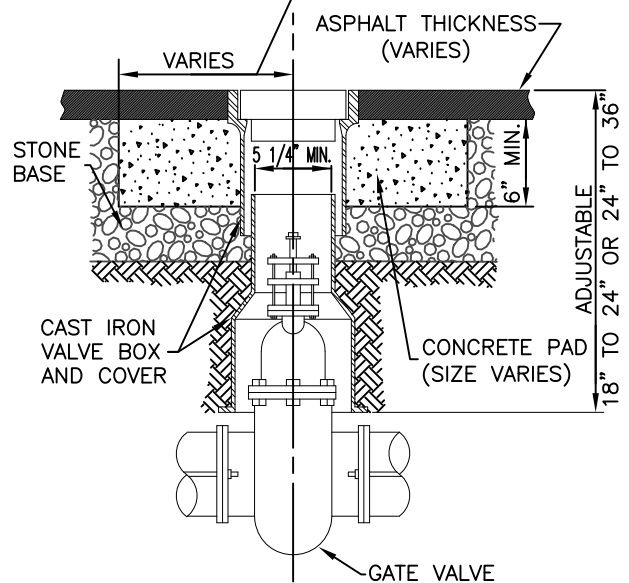


PLAN

SIZE VARIES AS  
DIRECTED BY  
THE ENGINEER



VALVE BOX NOT IN PAVEMENT



VALVE BOX IN PAVEMENT

PROVIDE HDPE INSERTS IN ALL VALVE BOXES BASED ON SPECIFICATIONS DESCRIBED IN DETAIL P-6.0



REVISION DATE:  
09/242010

## WATER VALVE BOX INSTALLATION FOR 4", 6", 8", AND 12" GATE VALVES

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
W-6.0

# VALVE PREFERENCE TABLE

THE FOLLOWING TABLE SUMMARIZES VALVE TYPES AND ACCESS ALLOWED FOR DIFFERENT SIZED VALVES:

VALVE SIZE (INCHES)	VALVE TYPE	TYPE OF ACCESS	SIZE OF ACCESS (FEET)
12 AND UNDER	RESILIENT WEDGE GATE	VALVE BOX, 2-PIECE SCREW TYPE	STANDARD
14	BUTTERFLY	MANHOLE	4
16	BUTTERFLY	MANHOLE	4
18	BUTTERFLY	MANHOLE	5
20	BUTTERFLY	MANHOLE	5
24	BUTTERFLY	MANHOLE	5
30	BUTTERFLY	MANHOLE	6
36	BUTTERFLY	MANHOLE	6
42	BUTTERFLY	MANHOLE	6

GATE VALVES MAY BE DEEMED NECESSARY BY THE ENGINEERING DIVISION.



REVISION DATE:  
12/07/2009

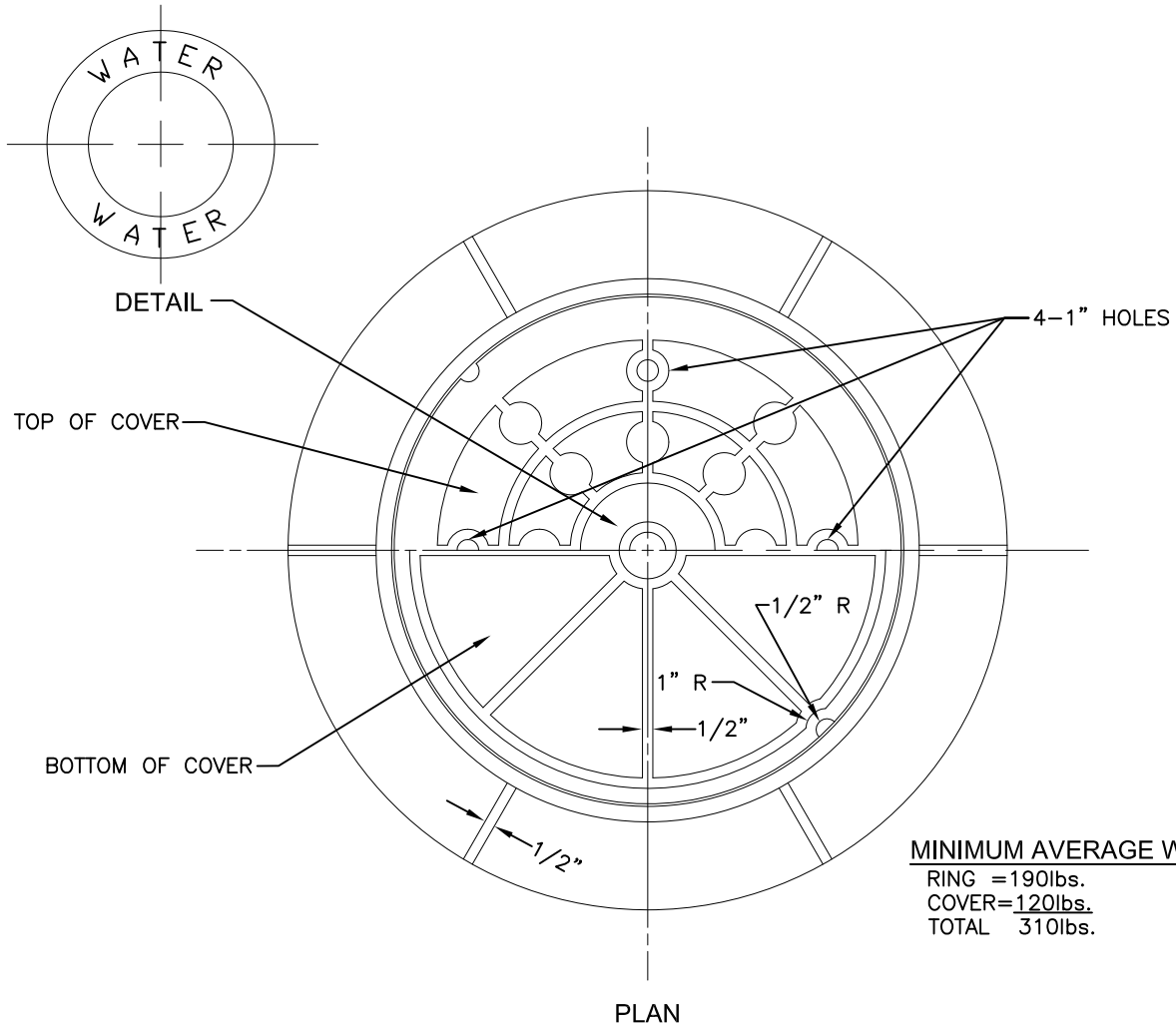
## VALVE PREFERENCE TABLE

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

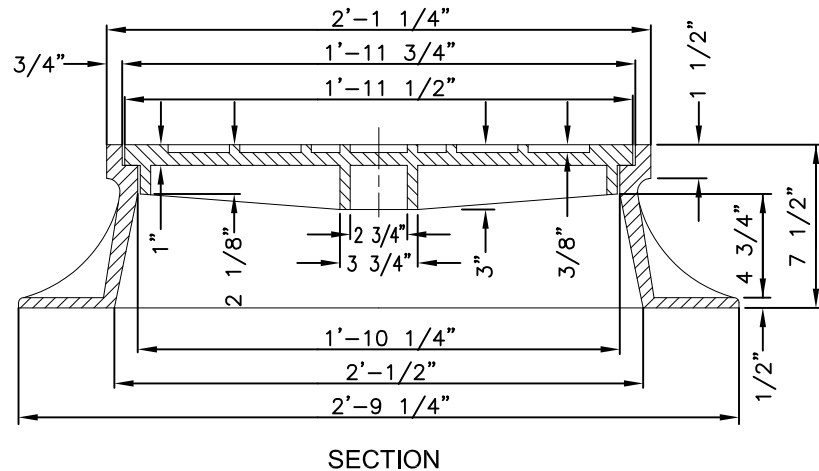
DETAIL NO.  
W-6.1

NOTE: SOLID COVER MAY BE REQUIRED DUE TO SITE CONDITIONS.



**MINIMUM AVERAGE WEIGHTS**

RING = 190lbs.  
COVER = 120lbs.  
TOTAL 310lbs.



PROVIDE HDPE INSERTS IN ALL MANHOLES BASED ON SPECIFICATIONS DESCRIBED IN DETAIL P-6.0



REVISION DATE:  
09/24/2010

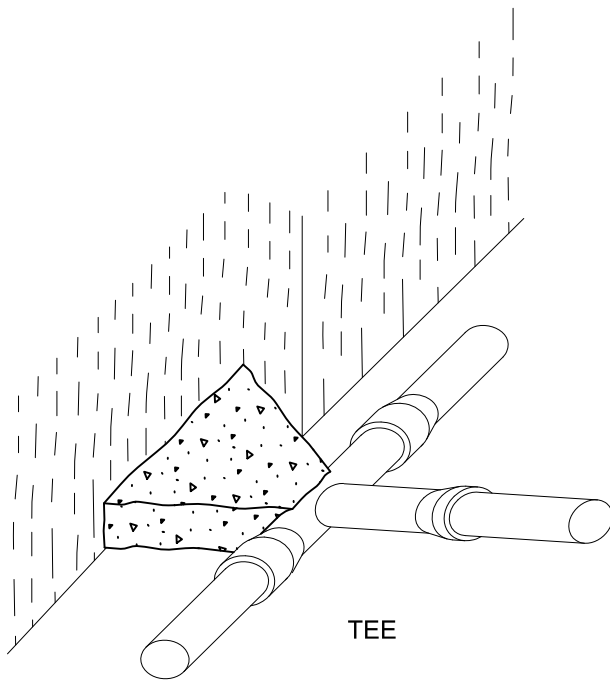
**WATER MANHOLE RING AND COVER**

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

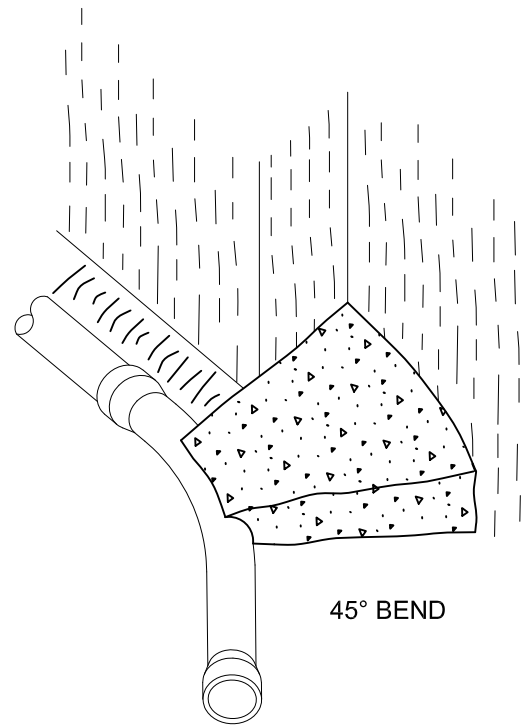
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DETAIL NO.  
W-7.0

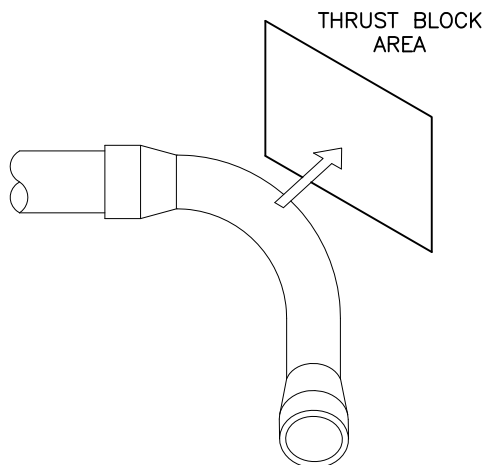




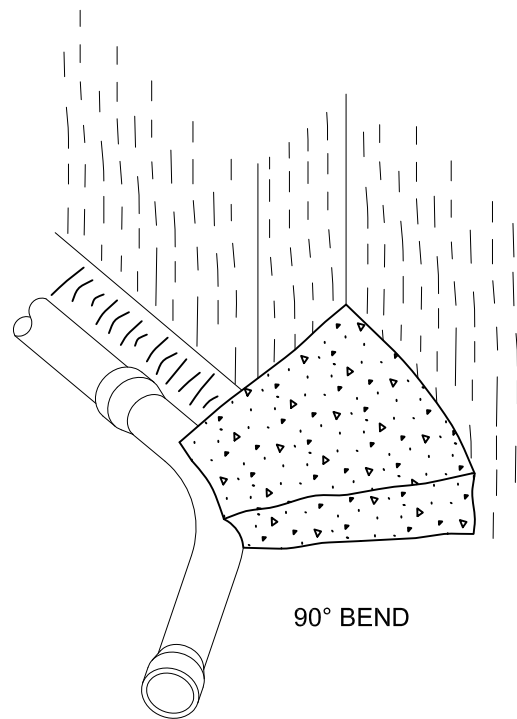
TEE



45° BEND



THRUST BLOCK  
AREA



90° BEND

NOTES:

1. CONCRETE SHALL BE 2500 PSI.
2. CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OF MECHANICAL JOINT FITTINGS.
3. TRENCHES SHALL CONFORM TO CITY OF DURHAM SPECIFICATIONS AND STANDARDS.
4. ALL BENDS AND TEES SHALL HAVE CONCRETE THRUST BLOCKING.

DURHAM



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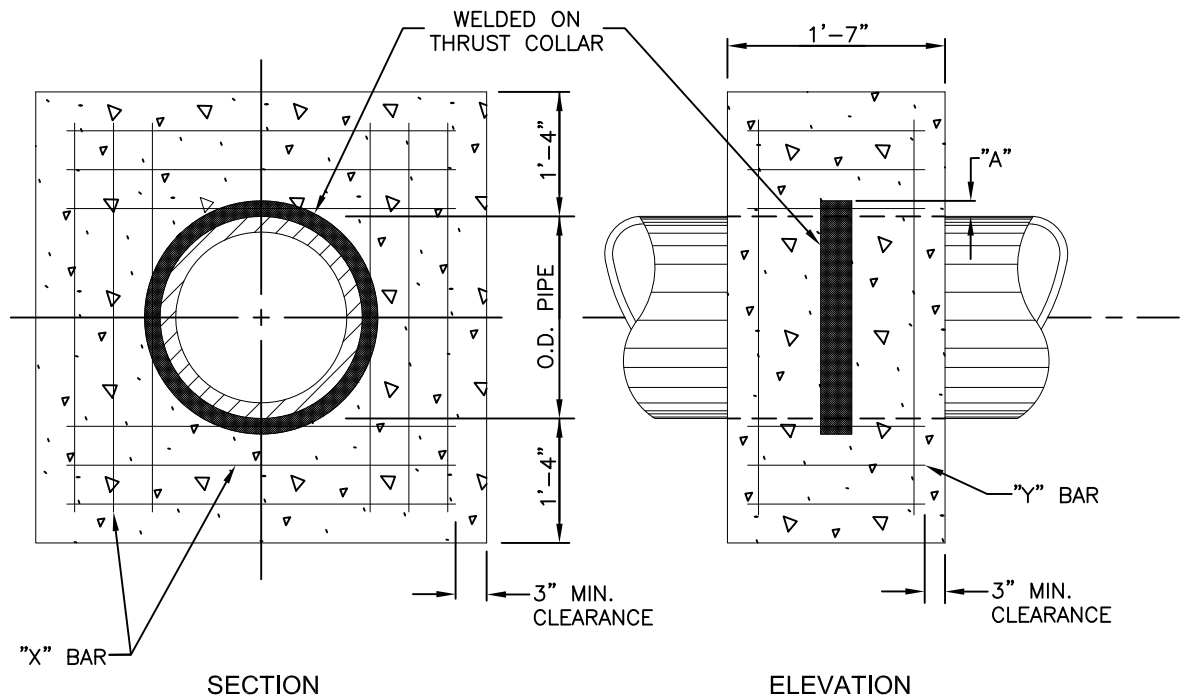
REVISION DATE:  
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## HORIZONTAL THRUST BLOCKING ISOMETRIC VIEWS

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NONE

DETAIL NO.  
W-8.0



WELDED ON THRUST COLLAR	
I.D. PIPE	"A"
6"-16"	2"
20"-24"	3"
30"-36"	4"

THRUST COLLAR REINFORCING		
	"X" BAR	"Y" BAR
BAR LENGTH	2'-2" + O.D. PIPE	1'-1"
REBAR SIZE	#5	#5
NUMBER REQ'D	24	12

NOTES:

1. CONCRETE SHALL BE 3000 P.S.I
2. REINFORCING BARS SHALL BE DEFORMED, AND TIED TOGETHER.
3. BACKFILL TAMPED IN 6" LAYERS
4. TRENCH BOTTOM WIDTH IN VICINITY OF THRUST BLOCK(S) INSTALLATION SHALL BE THE MINIMUM WIDTH AS DESCRIBED BY THE ENGINEER.

SIZE AND DEGREE OF BEND	STATIC THRUST IN POUNDS	CLAY FAIRLY DRY 4,000 LBS/SQ. FT.	CLAY SOFT 2,000 LBS/SQ. FT.	GRAVEL/SQ. FT. 1,500 LBS/SQ. FT.	CLAY & COARSE SAND 8,000 LBS/SQ. FT.	SAND ALWAYS DRY 8,000 LBS/SQ. FT.	SAND COMPACT FIRM 4,000 LBS/SQ. FT.	QUICKSAND & DRY 1,000 LBS/SQ. FT.	ROCK POOR 10,000 LBS/SQ. FT.
6" PIPE									
11 1/4°	1,108	1	1	1	1	1	1	2	1
22 1/2°	2,207	1	2	2	1	1	1	3	1
45°	4,328	2	3	3	1	1	2	5	1
90°	7,996	2	4	5	1	1	2	8	1
PLUG OR TEE	5,655	2	3	4	1	1	2	6	1
8" PIPE									
11 1/4°	1,970	1	1	2	1	1	1	2	1
22 1/2°	3,922	1	2	3	1	1	1	4	1
45°	7,694	2	4	5	1	1	2	8	1
90°	14,215	4	8	9	2	2	4	15	2
PLUG OR TEE	10,053	3	5	6	2	2	3	10	1
12" PIPE									
11 1/4°	4,433	2	3	3	1	1	2	5	1
22 1/2°	8,826	3	5	6	2	2	3	9	1
45°	17,312	5	9	11	3	3	5	18	2
90°	31,983	8	16	19	4	4	8	32	4
PLUG OR TEE	22,619	6	12	14	3	3	6	23	3
16" PIPE									
11 1/4°	7,881	2	4	5	1	1	2	8	1
22 1/2°	15,691	4	8	10	2	2	4	16	2
45°	7,694	8	16	19	4	4	8	31	4
90°	56,861	15	29	35	8	8	15	57	6
PLUG OR TEE	40,213	10	21	25	5	5	10	41	5
20" PIPE									
11 1/4°	12,315	3	7	8	2	2	3	13	2
22 1/2°	24,517	7	13	15	4	4	7	25	3
45°	48,091	12	24	29	6	6	12	48	5
90°	88,844	23	45	53	12	12	23	89	9
PLUG OR TEE	62,832	16	32	38	8	8	16	63	7
24" PIPE									
11 1/4°	17,734	5	9	11	3	3	5	18	2
22 1/2°	35,305	9	18	22	5	5	9	36	4
45°	69,252	18	35	42	9	9	18	70	7
90°	127,936	32	64	77	16	16	32	128	13
PLUG OR TEE	90,478	23	46	55	12	12	23	91	10
30" PIPE									
11 1/4°	27,709	7	14	17	4	4	7	2	3
22 1/2°	55,163	14	28	34	7	7	14	56	6
45°	108,206	28	55	65	14	14	28	109	11
90°	199,900	50	100	120	25	25	50	200	20
PLUG OR TEE	141,372	36	71	85	18	18	36	142	15
36" PIPE									
11 1/4°	39,901	10	20	24	5	5	10	40	4
22 1/2°	79,435	20	40	48	10	10	20	80	8
45°	155,816	39	78	94	20	20	39	156	16
90°	247,855	72	144	172	36	36	72	288	29
PLUG OR TEE	203,575	51	102	122	26	26	51	204	21

GENERAL NOTES:

1. BASED ON TEST PRESSURE OF 200 P.S.I. ALL AREAS GIVEN IN SQUARE FEET.
2. REACTION BEARING AREAS ARE IN SQUARE FEET MEASURED IN A VERTICAL PLANE IN THE TRENCH SIDE AT AN ANGLE OF 90° TO THE THRUST VECTOR.
3. USE 6"-90° BEND VALUE FOR HYDRANTS FOR ADDITIONAL SAFETY FACTORS.

DURHAM



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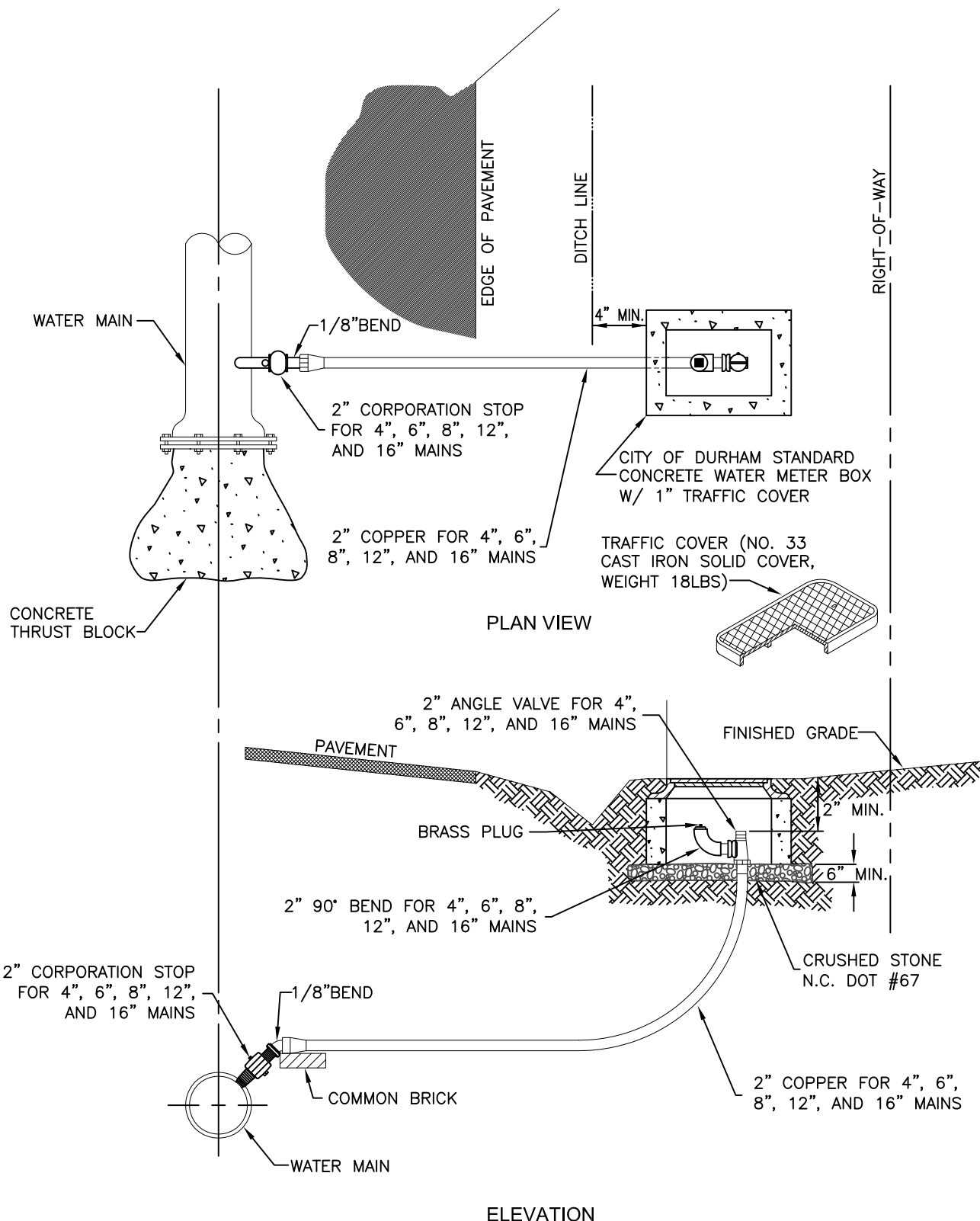
REVISION DATE:  
12/07/2009

## HORIZONTAL THRUST BLOCKING SCHEDULE

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
W-8.2



NOTE:

1. EZ HYDRANTS CAN BE REQUIRED AT THE CITY'S DIRECTION.



REVISION DATE:  
03/18/2010

## BLOW-OFF ASSEMBLY FOR 4", 6", 8", 12", AND 16" WATER MAINS

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
W-9.0

## MAXIMUM TAP SIZES FOR DUCTILE IRON PIPES

THE FOLLOWING TABLE SUMMARIZES THE MAXIMUM TAP SIZES FOR VARIOUS CLASSES OF DUCTILE IRON PIPE:

PIPE DIAMETER (INCHES)	MAXIMUM TAP SIZE FOR CLASS 50 /51 PIPE (INCHES)	MAXIMUM TAP SIZE FOR CLASS 250 /350 PIPE (INCHES)
4	3/4	3/4
6	3/4	3/4
8	1-1/2	1
10	1-1/2	1-1/2
12	1-1/2	1-1/2
14	2	1-1/2
16	2	2

THIS TABLE IS BASED ON INFORMATION FROM TABLES 50.16 AND 50.5 OF ANSI / AWWA C150/A21.51-91 FOR CLASS 50 /50 AND CLASS 250 /350 PIPE, RESPECTIVELY; AND FROM TABLE A.2 OF APPENDIX A FROM ANSI / AWWA C151/A21.51-91 FOR TAPS WITH TWO THREADS USING STANDARD CORPORATION STOPS. IF TAP REQUIREMENTS EXCEED TWO THREADS, OR IF THE REQUIRED TAP SIZES EXCEED THE MAXIMUM TAP SIZES LISTED IN THIS TABLE, TAPPING SADDLES MAY BE USED TO MAKE THE TAP. TAPPING SADDLES SHALL BE AS MANUFACTURED BY AMERICAN PIPE COMPANY, OR EQUAL.

REVERSE TAPS REQUIRE PLAN APPROVAL FROM DEVELOPMENT REVIEW MANAGER.

DURHAM



1 8 6 9  
CITY OF MEDICINE

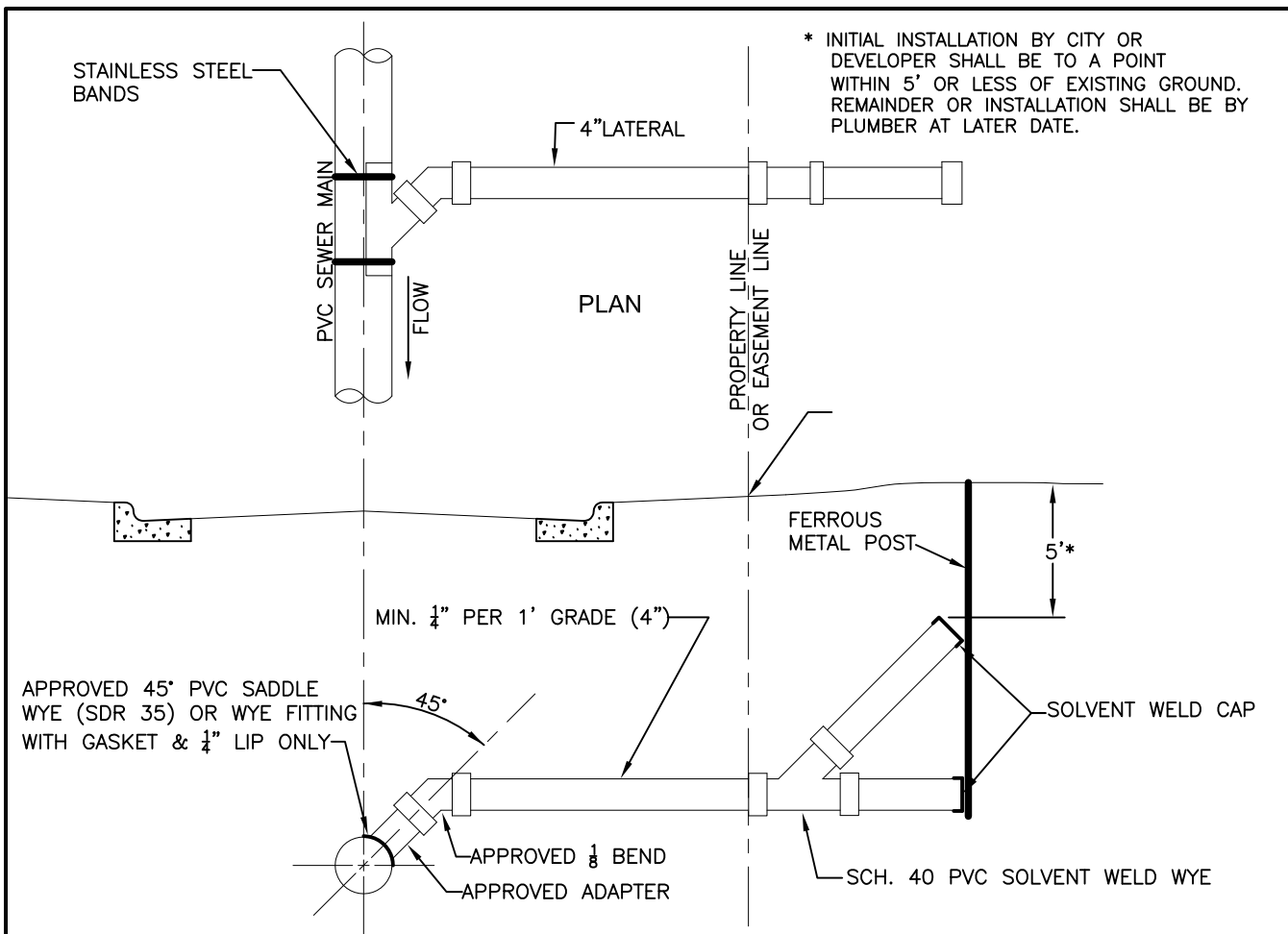
REVISION DATE:  
12/07/2009

### MAXIMUM TAP SIZES FOR DUCTILE IRON PIPES

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

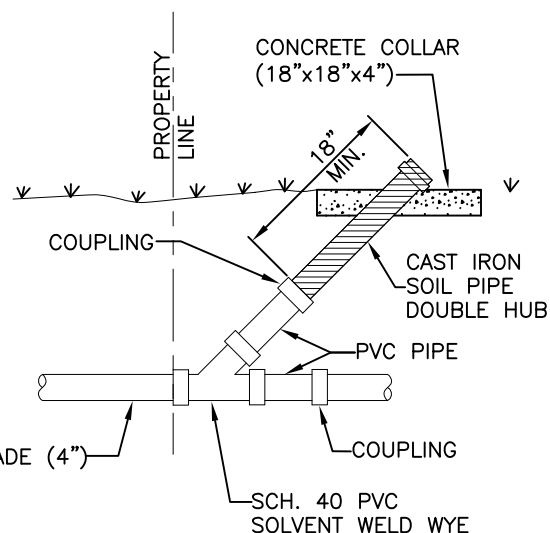
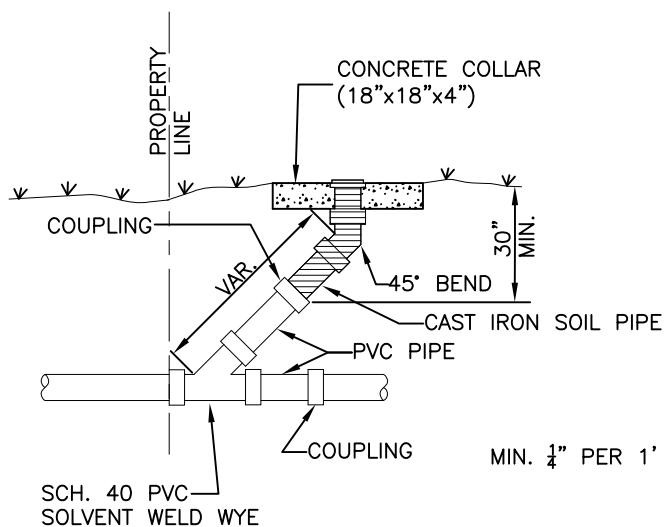
DETAIL NO.  
W-10.0



# SECTION

## STANDARD SEWER MAIN LATERAL STUB-OUT

PVC SEWER MAIN



## CLEAN OUT DETAILS

INSTALLED BY PLUMBER

DURHAM



1869  
CITY OF MEDICINE

REVISION DATE  
03/18/2010

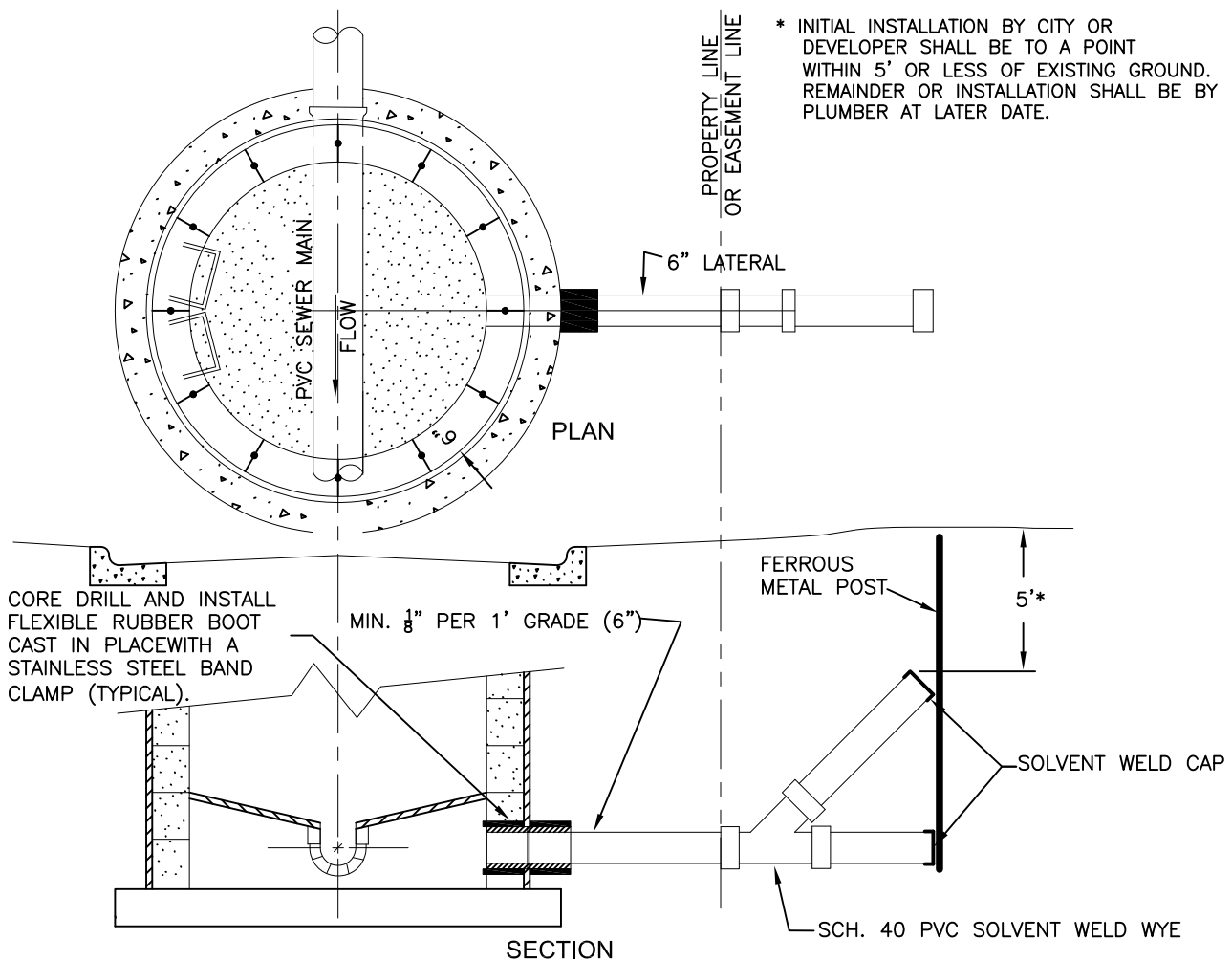
## SANITARY SEWER LATERAL

4" SEWER LATERAL

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

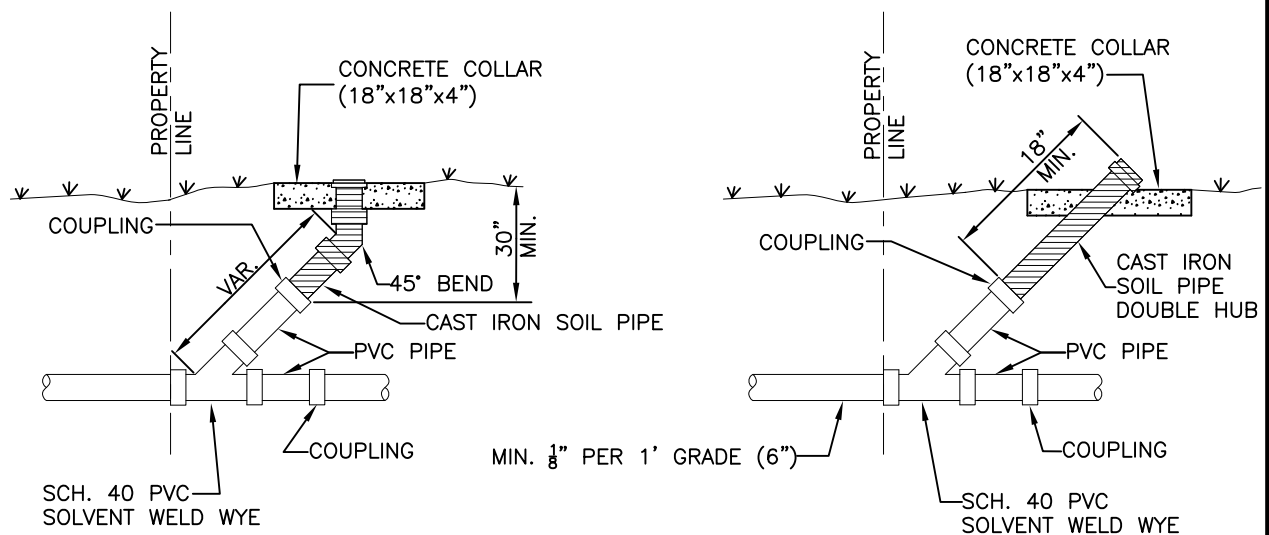
SCALE:  
NTS

DETAIL NO.  
SS-1.0



## STANDARD SEWER MAIN LATERAL STUB-OUT

PVC SEWER MAIN



## CLEAN OUT DETAILS

INSTALLED BY PLUMBER



REVISION DATE  
03/18/2010

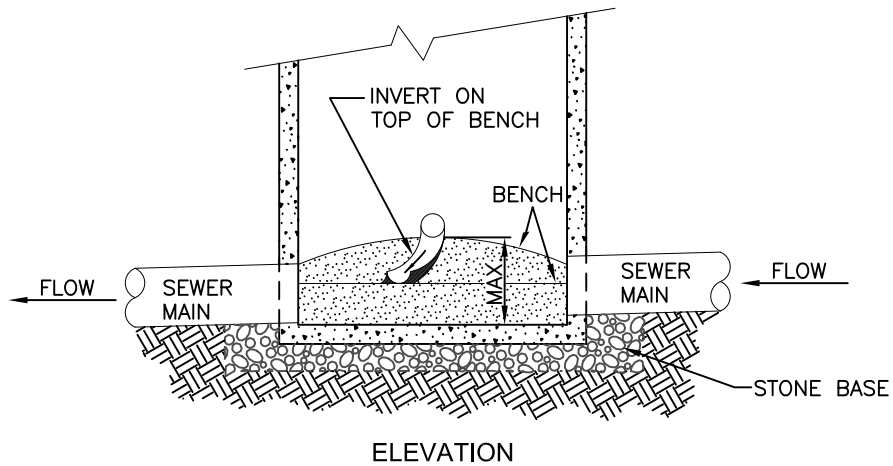
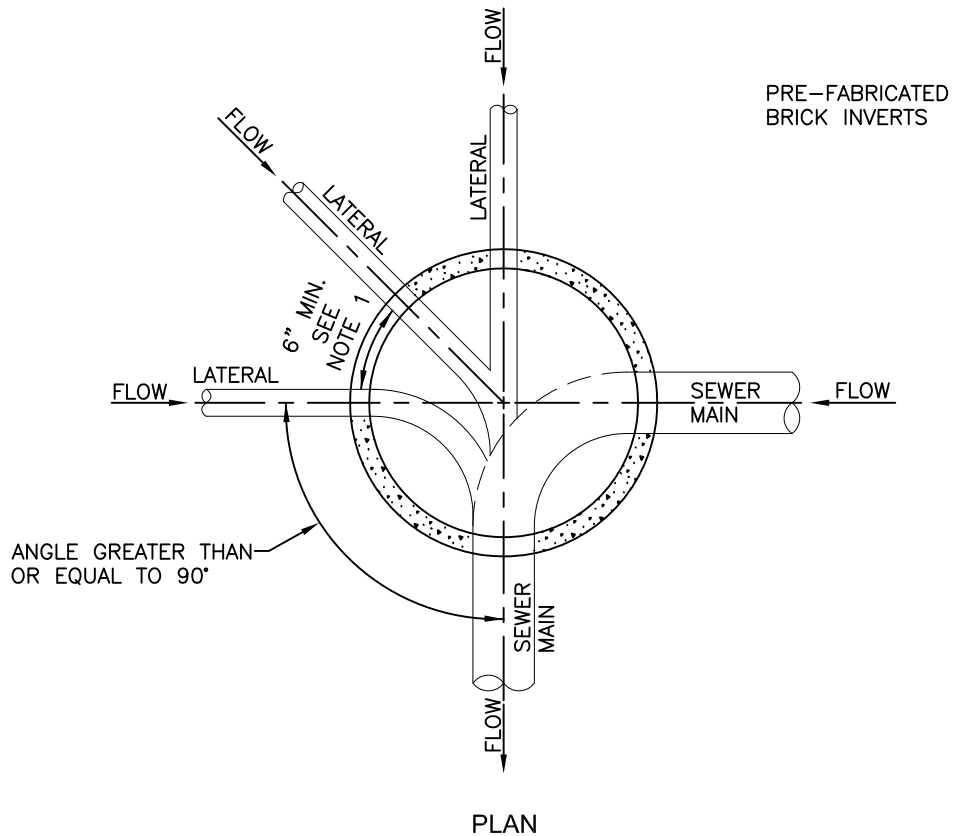
## SANITARY SEWER LATERAL

6" SEWER LATERAL

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
SS-1.1



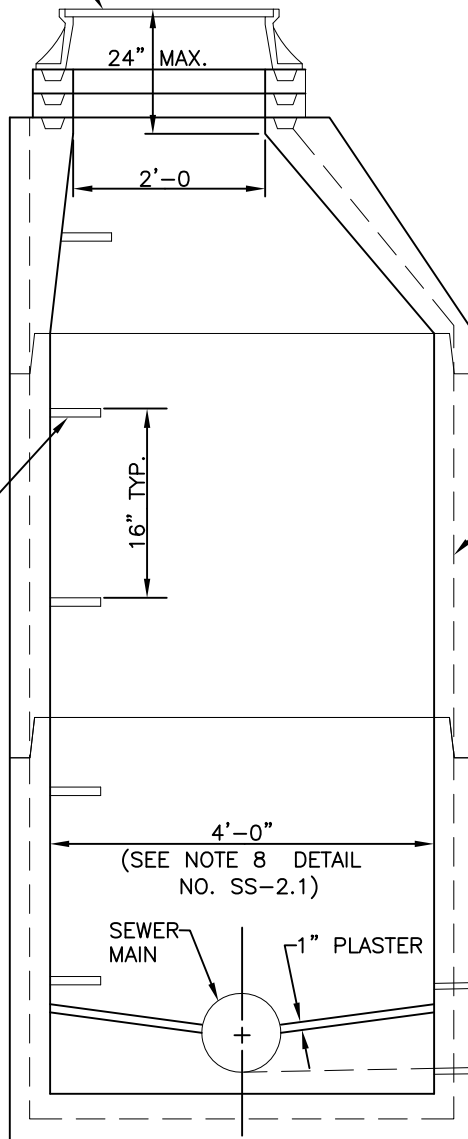
NOTES:

1. THE MINIMUM SPACING FROM THE EDGE OF A CORE FOR A LATERAL TO THE EDGE OF THE NEXT CORE SHALL BE 6 INCHES.
2. SEWER LATERAL SHALL NOT ENTER A MANHOLE AT AN ANGLE LESS THAN 90° TO THE EFFLUENT PIPE.
3. ALL LATERALS TO BE INSTALLED AT THE TOP OF THE BENCH.
4. PROVIDE BRICK OR CONCRETE FOR INVERT.
5. INVERTS TO BE BUILT FROM LATERAL TO EFFLUENT PIPE.
6. THE MAXIMUM NUMBER OF LATERALS FOR ANY ONE MANHOLE IS FIVE (5).
7. ALL NEW LATERALS INTO MANHOLES MUST BE CORE DRILLED AND INSTALLED WITH A FLEXIBLE RUBBER BOOT.



MANHOLE RING AND COVER  
(DETAIL NO. SS-2.4)

MANHOLE STEP  
(DETAIL NO. SS-2.5)



STEEL REINFORCEMENT (NOTE  
3 DETAIL NO. SS-2.1)

FLEXIBLE RUBBER  
SLEEVE BOOT (NOTE 5  
DETAIL NO. SS-2.1)

SEWER  
MAIN

1" PLASTER

SEWER  
MAIN

FLOW

## NOTES

1. ALL PRE CAST CONCRETE MANHOLES SHALL CONFORM TO THE LATEST REVISION OF ASTM C478.
2. CONCRETE SHALL BE 4000 PSI AT 28 DAYS MINIMUM.
3. STEEL REINFORCEMENT SHALL BE GRADE 40 BILLET STEEL CONFORMING TO THE LATEST REVISION OF ASTM-A-185 FOR WALL REINFORCEMENT, AND THE LATEST REVISION OF ASTM-A615 FOR THE BASE REINFORCEMENT.
4. STANDARD JOINTS SHALL BE; SEALED WITH PUTTY TYPE PLASTIC CEMENT PER FED. SPEC. SS-C-153 OR AN O-RING TYPE JOINT CONFORMING TO THE LATEST REVISION OF ASTM-C443.
5. MANHOLE INLETS AND OUTLETS SHALL BE CAST IN PLACE FLEXIBLE RUBBER SLEEVES BOOTS PER THE LATEST REVISION OF ASTM-C923.
6. INVERTS TO BE CONSTRUCTED OF BRICK WITH A CONCRETE BENCH (DETAIL NO. SS-2.2).
7. THE MAXIMUM SEPARATION OR INVERT IN TO INVERT OUT WITHIN A MANHOLE IS 0.50 FEET. WHEN THE SEPARATION IS GREATER THAN 0.5 FEET A DROP MANHOLE MUST BE USED.
8. MANHOLES GREATER THAN 18 FEET IN DEPTH SHALL HAVE AN INSIDE DIAMETER OR 5'-0". FOR SANITARY SEWER MAINS GREATER THAN EIGHTEEN INCHES (18") IN DIAMETER, MANHOLES SHALL BE A MINIMUM OF 5'-0" IN DIAMETER.
9. RIM ELEVATIONS SHALL BE AT GRADE IN STREETS & PARKING LOTS.
10. RIM ELEVATIONS ALONG OUTFALLS SHALL BE A MINIMUM OF 3' ABOVE EXISTING GROUND ELEVATION. IF THE OUTFALL IS LOCATED WITHIN THE FLOOD PLAIN, RIM ELEVATIONS SHALL BE 2' ABOVE THE 100-YEAR FLOOD ELEVATION (WHILE STILL MAINTAINING THE 3' ABOVE THE EXISTING GROUND ELEVATION MINIMUM REQUIREMENT). THE 100-YEAR FLOOD ELEVATION SHALL BE NOTED ON THE CONSTRUCTION DRAWINGS.
11. DEPENDING UPON THE HEIGHT OF THE MANHOLE, THE CITY OF DURHAM ENGINEERING DIVISION MAY REQUIRE FLAT MANHOLES, EXTERIOR STEPS AND SAFETY BARS ON TOP OF THE MANHOLE.



REVISION DATE:  
12/07/2009

### PRECAST CONCRETE SANITARY SEWER MANHOLE NOTES

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

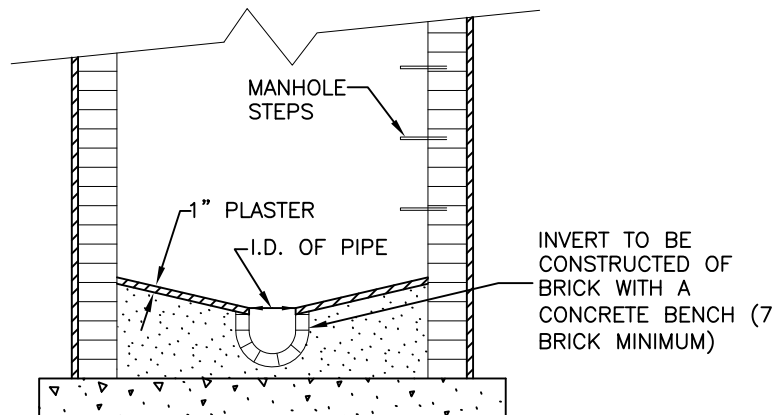
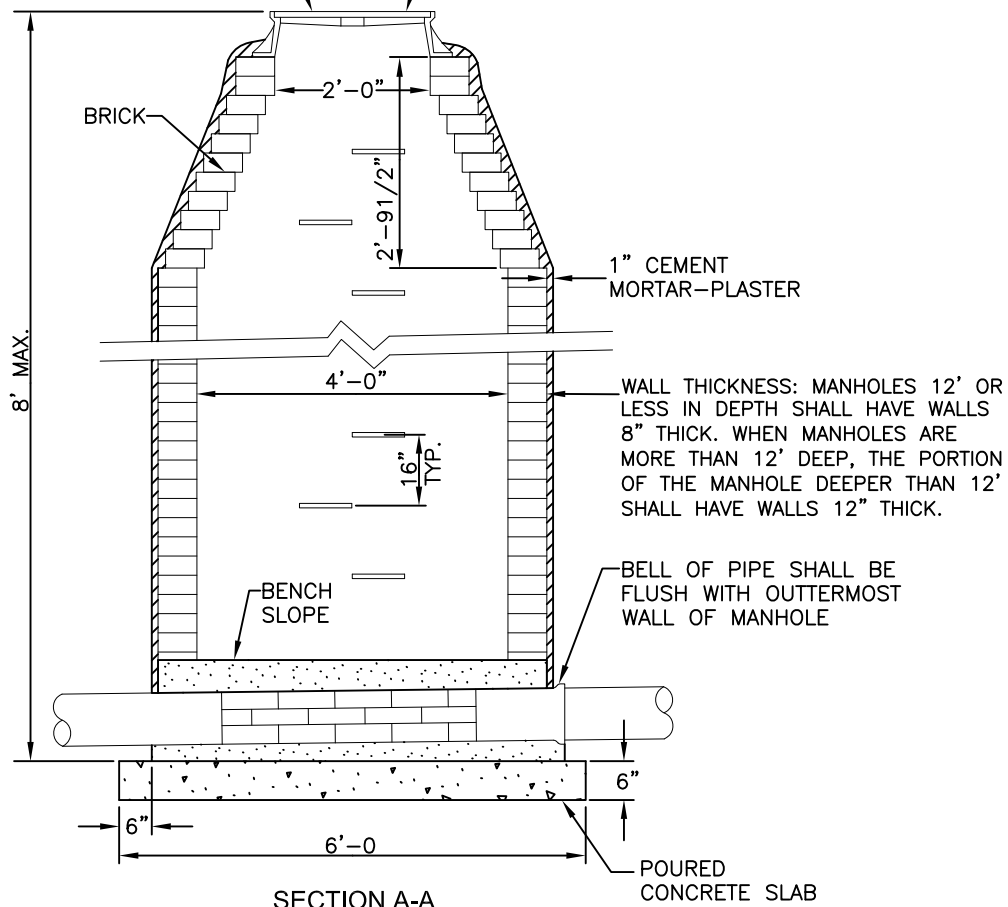
SCALE:  
NTS

DETAIL NO.  
SS-2.1

MANHOLE RING AND COVER  
(DETAIL NO. SS-2.4)

RIM ELEVATIONS:

- AT GRADE IN STREETS AND PARKING LOTS
- 3.0 FEET ABOVE GROUND IN OUTFALLS
- 2.0 FEET ABOVE 100 YEAR FLOOD PLAIN



\*CITY OF DURHAM ENGINEERING INSPECTIONS APPROVAL IS  
REQUIRED BEFORE THE USE OF THIS STRUCTURE.

DURHAM



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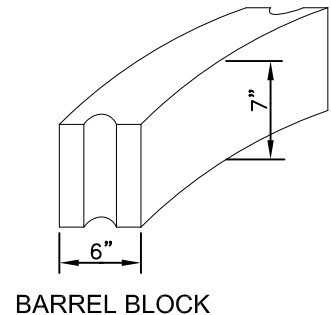
REVISION DATE:  
12/07/2009

## BRICK SANITARY SEWER MANHOLE

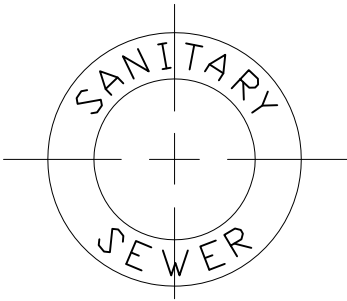
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SCALE:  
NTS

DETAIL NO.  
SS-2.2



DETAIL NO.  
SS-2.3



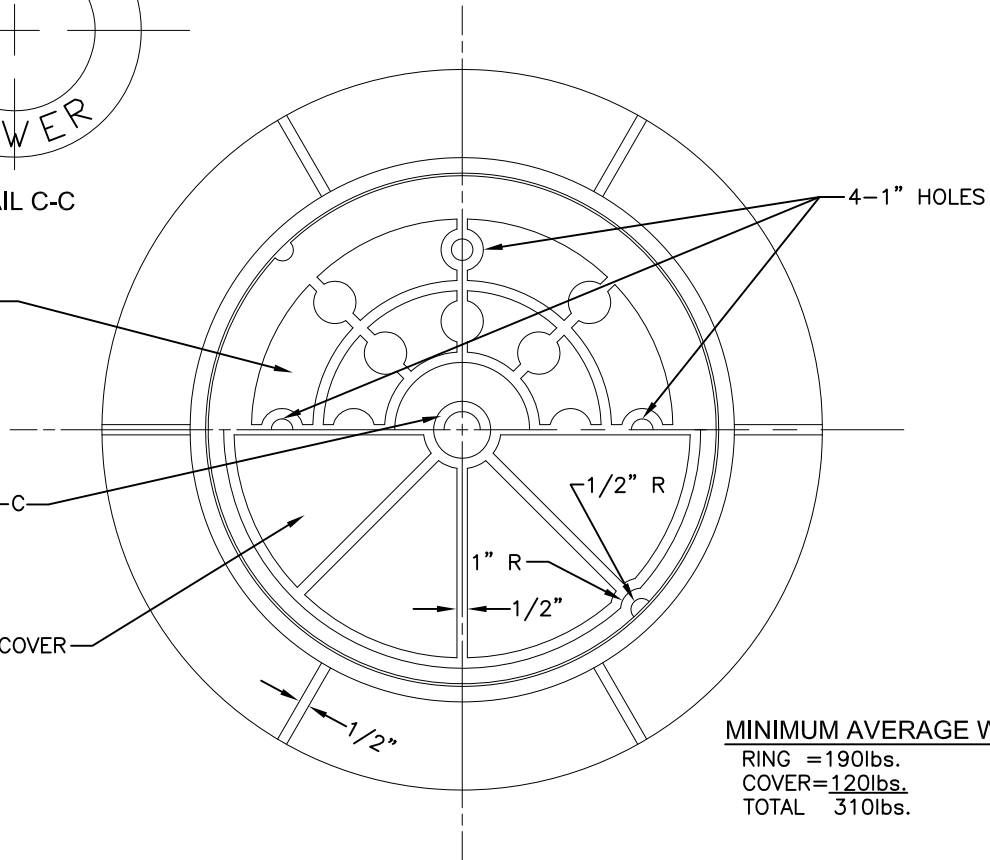
DETAIL C-C

SOLID COVER MAY BE REQUIRED  
DEPENDING ON FIELD CONDITIONS

TOP OF COVER

SEE DETAIL C-C

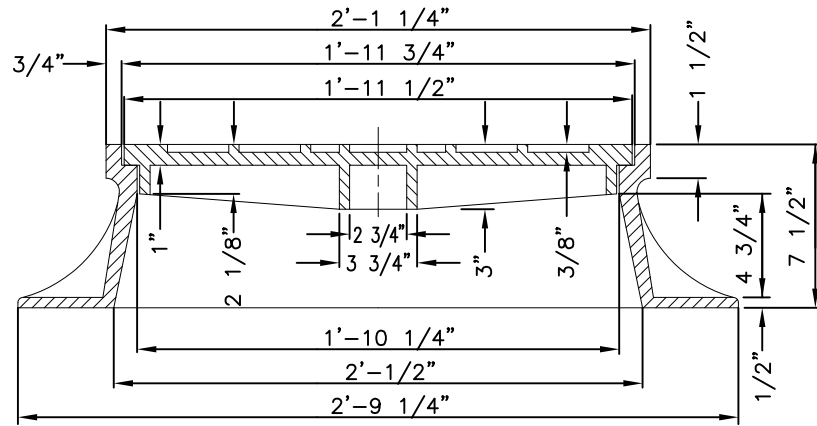
BOTTOM OF COVER



**MINIMUM AVERAGE WEIGHTS**

RING = 190lbs.  
COVER = 120lbs.  
TOTAL 310lbs.

PLAN



SECTION

PROVIDE HDPE INSERTS IN ALL MANHOLES BASED ON SPECIFICATIONS DESCRIBED IN DETAIL P-6.0

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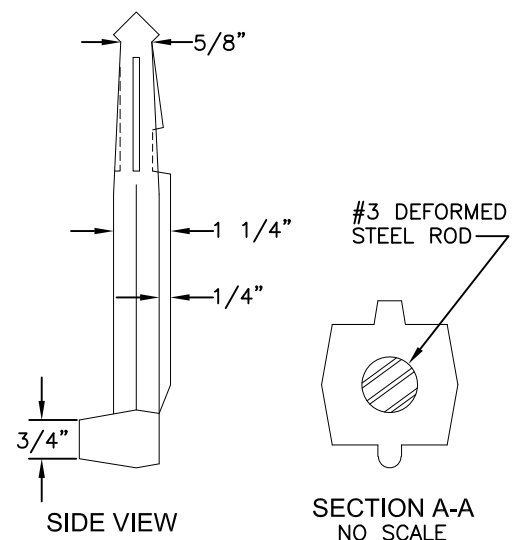
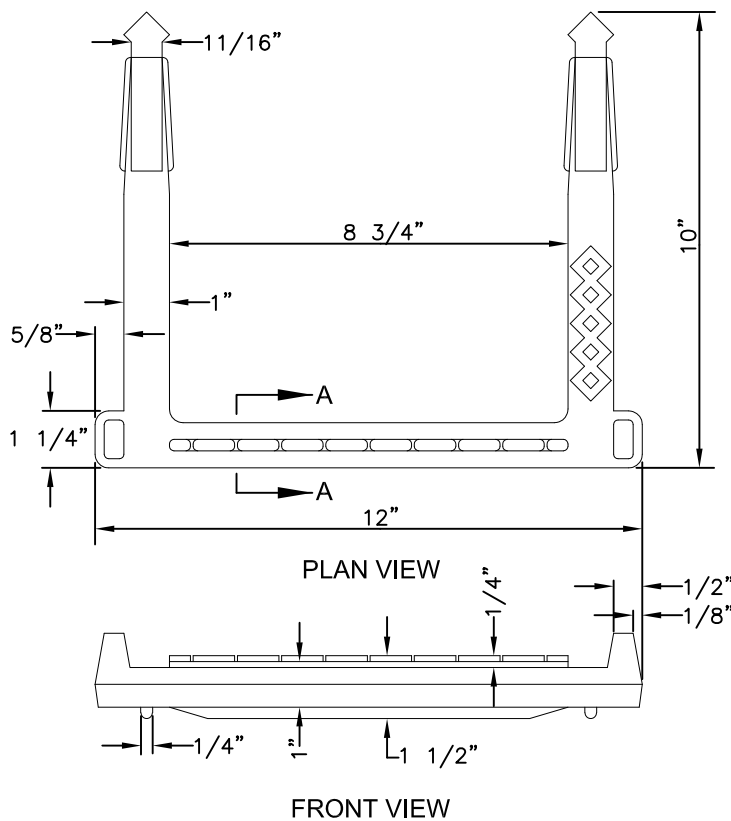
REVISION DATE:  
09/24/10

**SANITARY SEWER MANHOLE  
RING AND COVER**

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DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
SS-2.4



DIMENSIONS OF STEPS MAY VARY  
DEPENDING ON MANHOLE WALL  
THICKNESS AND TYPE OF  
CONSTRUCTION.



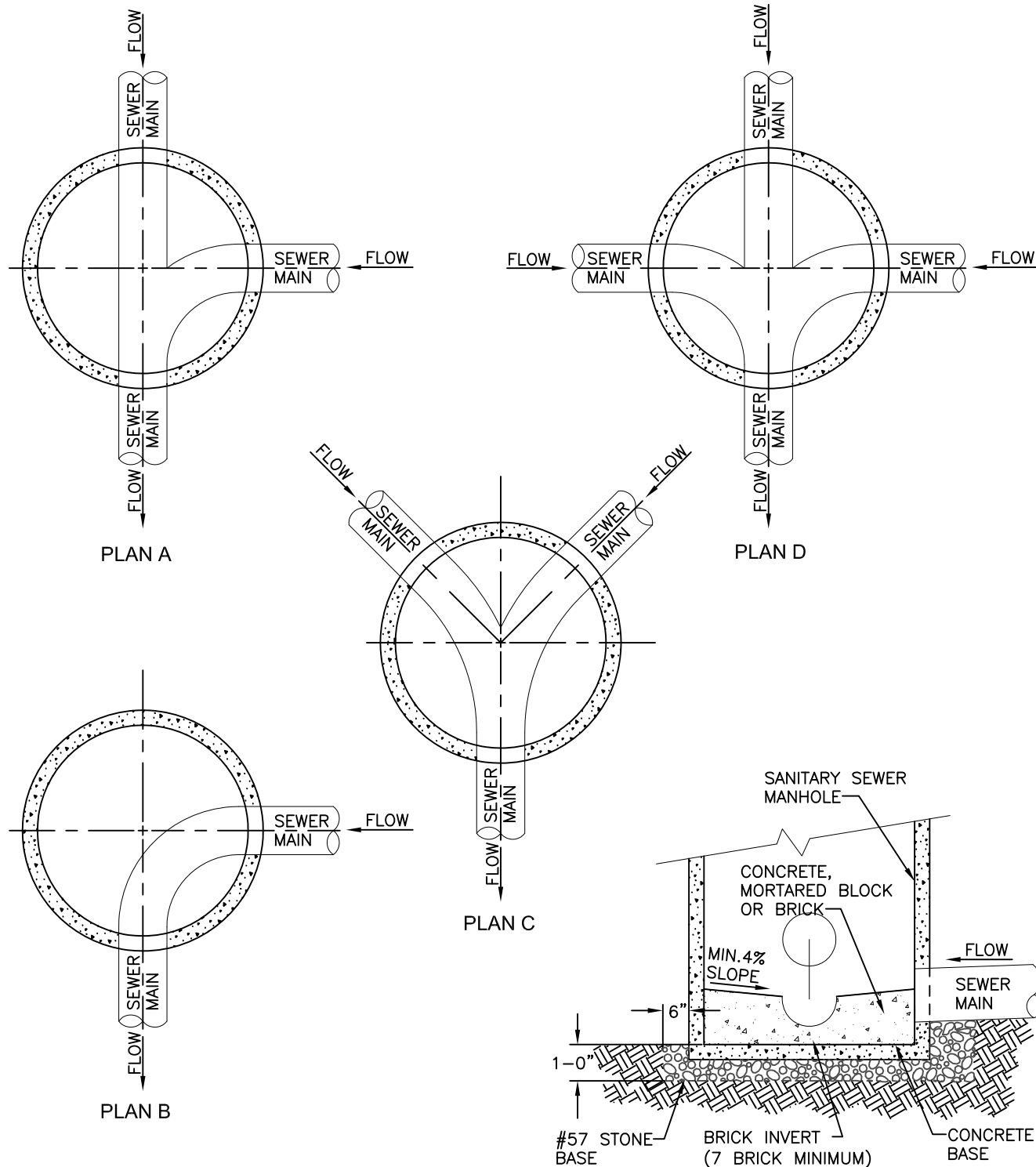
REVISION DATE:  
12/072009

## PLASTIC COATED SANITARY SEWER MANHOLE STEPS

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
SS-2.5



NOTES:

1. INVERT MATERIAL SHALL BE CONCRETE CAST IN PLACE WITH A SMOOTH FINISH.
2. WIDTH OF INVERT SHALL MATCH INSIDE DIAMETER OF INCOMING AND OUTGOING PIPES.
3. BRICK INVERT SHALL BE FORMED AS SHOWN.
4. ALL INVERT ELEVATIONS SHALL BE AS SHOWN ON APPROVED CONSTRUCTION PLANS.
5. BENCHES TO BE BUILT OUT OF CONCRETE, MORTARED BLOCK OR BRICK. STONE IS NOT ACCEPTABLE.

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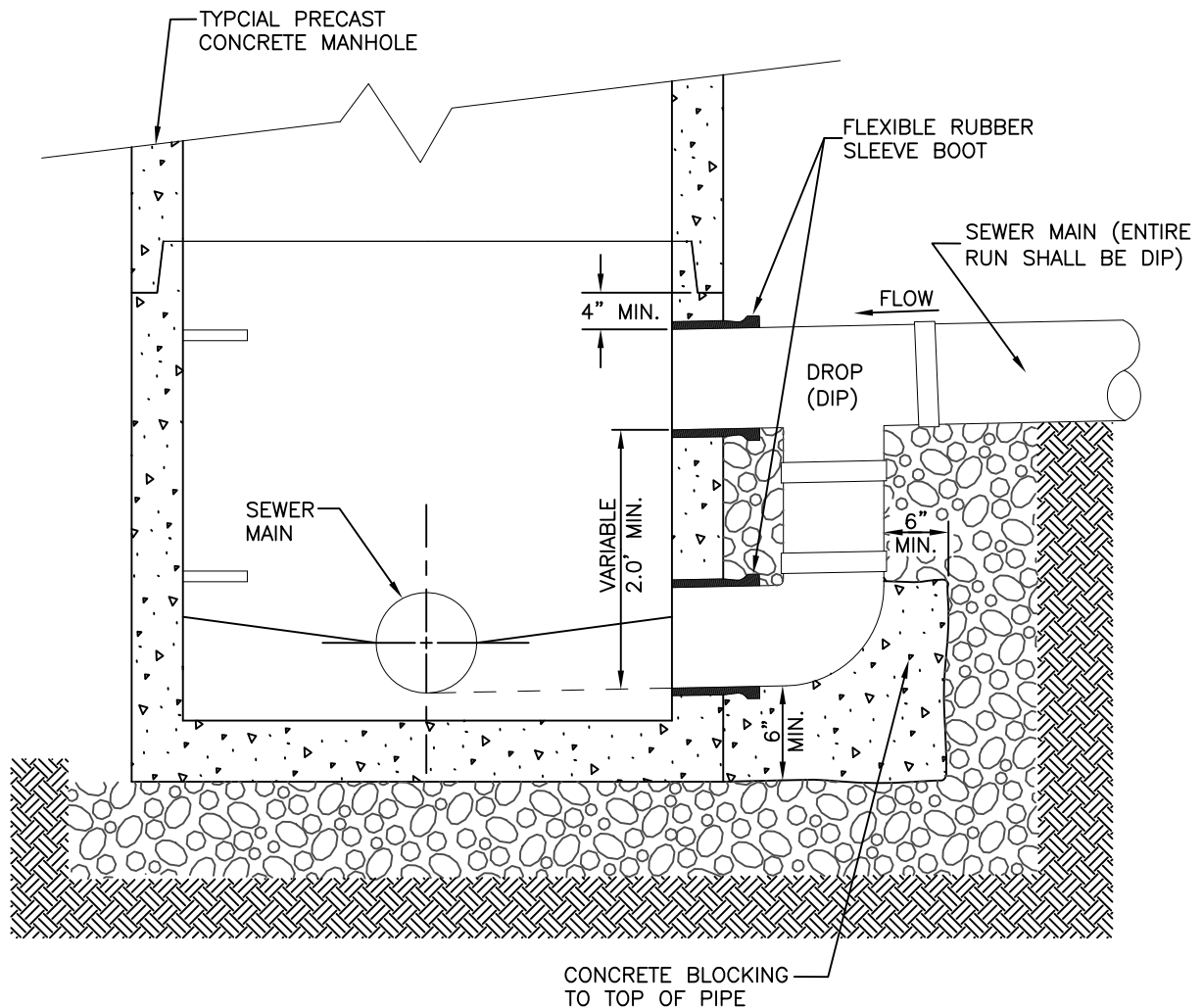
REVISION DATE:  
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## SANITARY SEWER MANHOLE INVERT

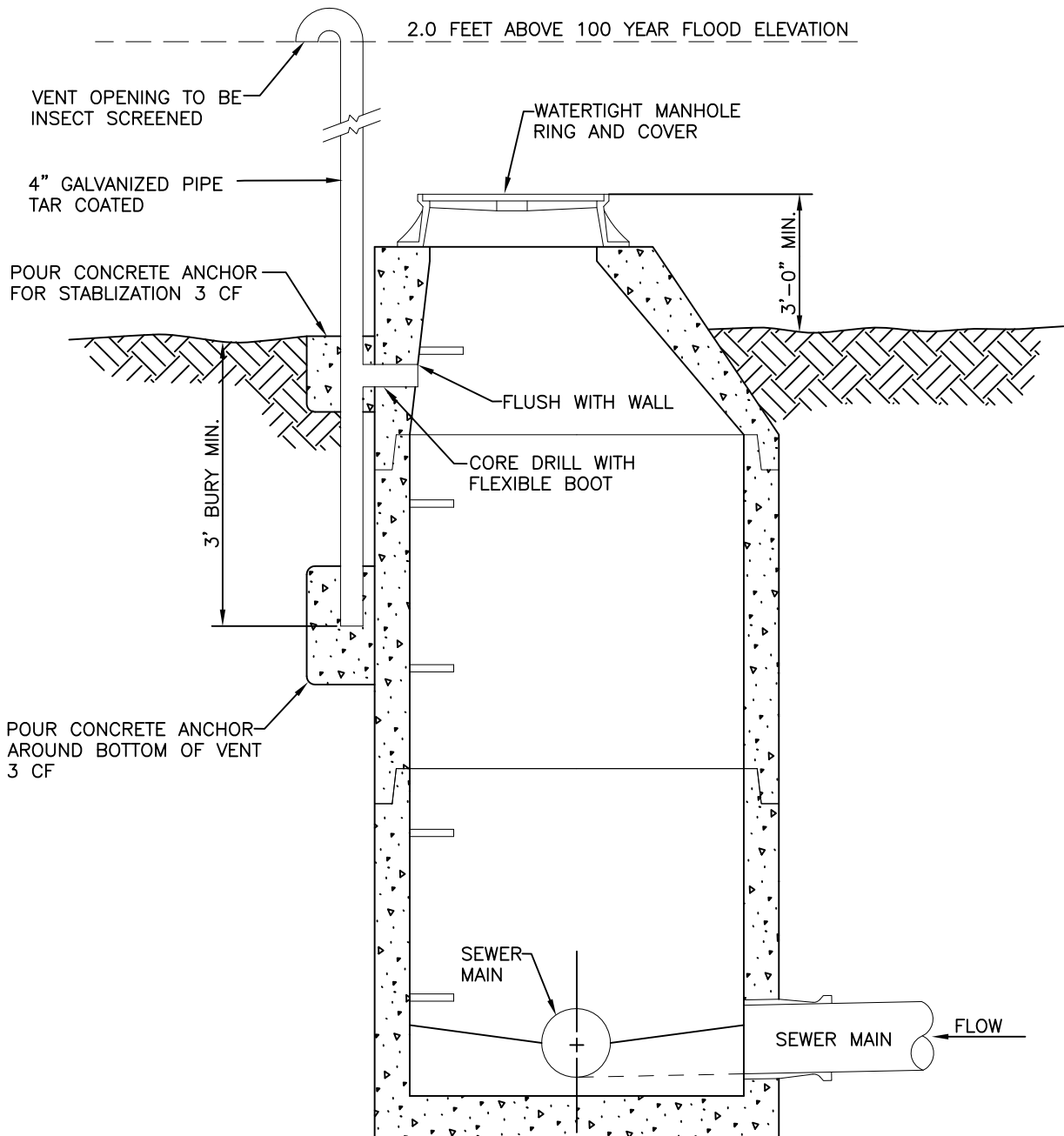
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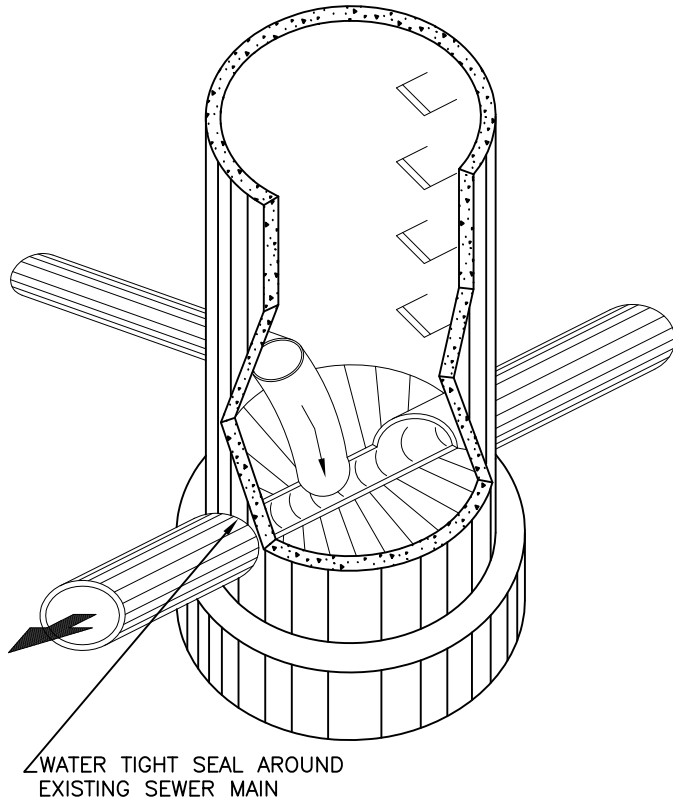
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DETAIL NO.  
SS-2.6

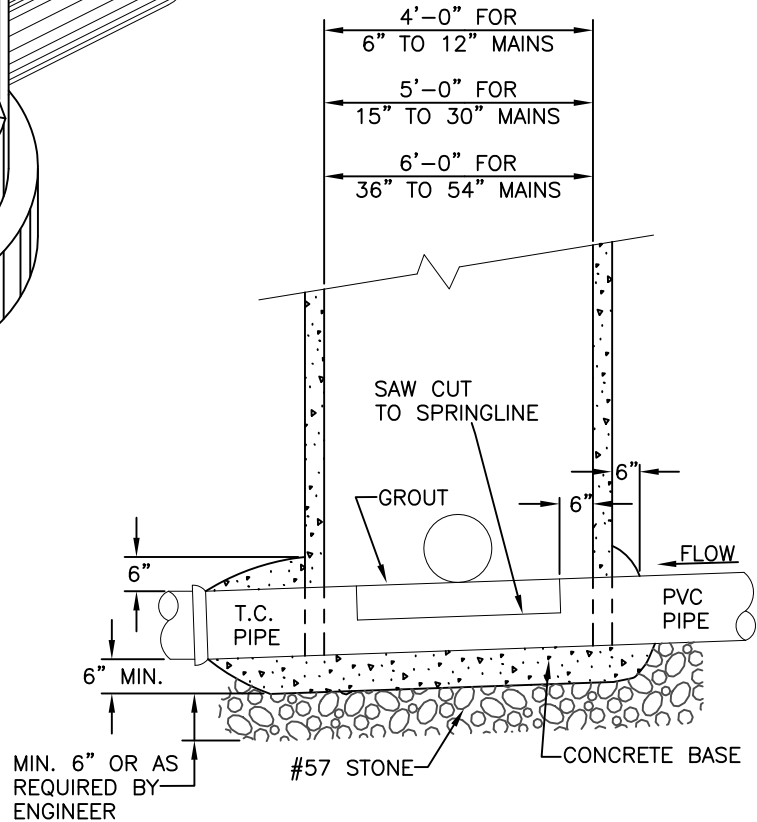








ISOMETRIC VIEW



CROSS-SECTION

NOTES:

1. MANHOLE TO BE SET ON CONCRETE BASE AND BASE TO BE ONE POUR.
2. FOR VITRIFIED CLAY PIPE, CONCRETE SHALL BE POURED TO NEXT EXISTING JOINT (BOTH SIDES OF MANHOLE).
3. PIPE OPENING SHALL BE PRECAST BY MANUFACTURER.
4. FLOW SHALL BE MAINTAINED DURING CONSTRUCTION.
5. MINIMUM OF 4000 PSI CONCRETE REQUIRED.
6. THE CONTRACTOR SHALL PROVIDE A MINIMUM 6" COMPACTED #57 STONE BASE.
7. INVERT TO BE BUILT FROM PROPOSED PIPE TO EFFLUENT PIPE, ACCORDING TO DETAIL ON INVERTS.

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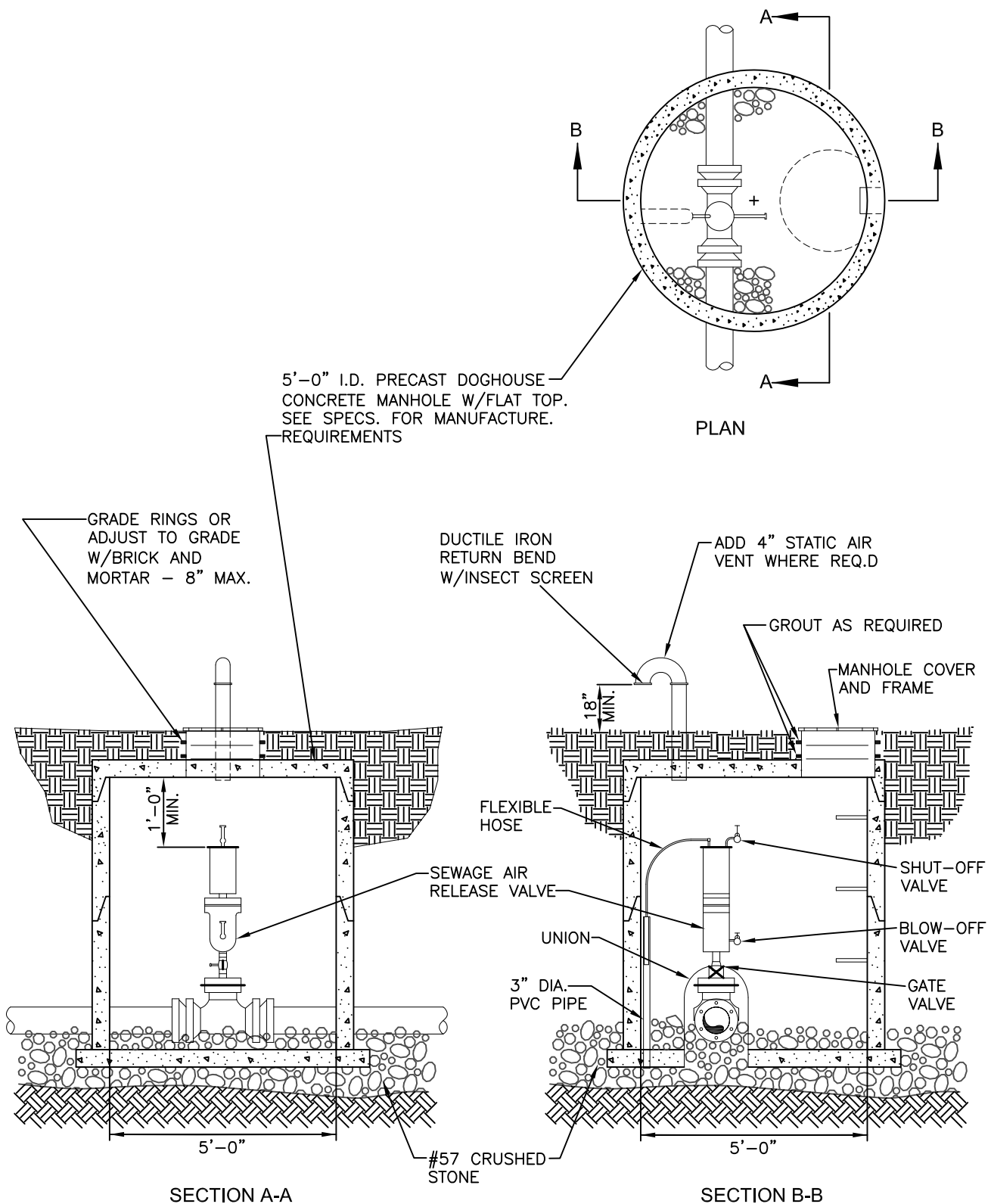
REVISION DATE:  
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## DOGHOUSE MANHOLE INSTALLATION OVER EXISTING SEWER MAIN

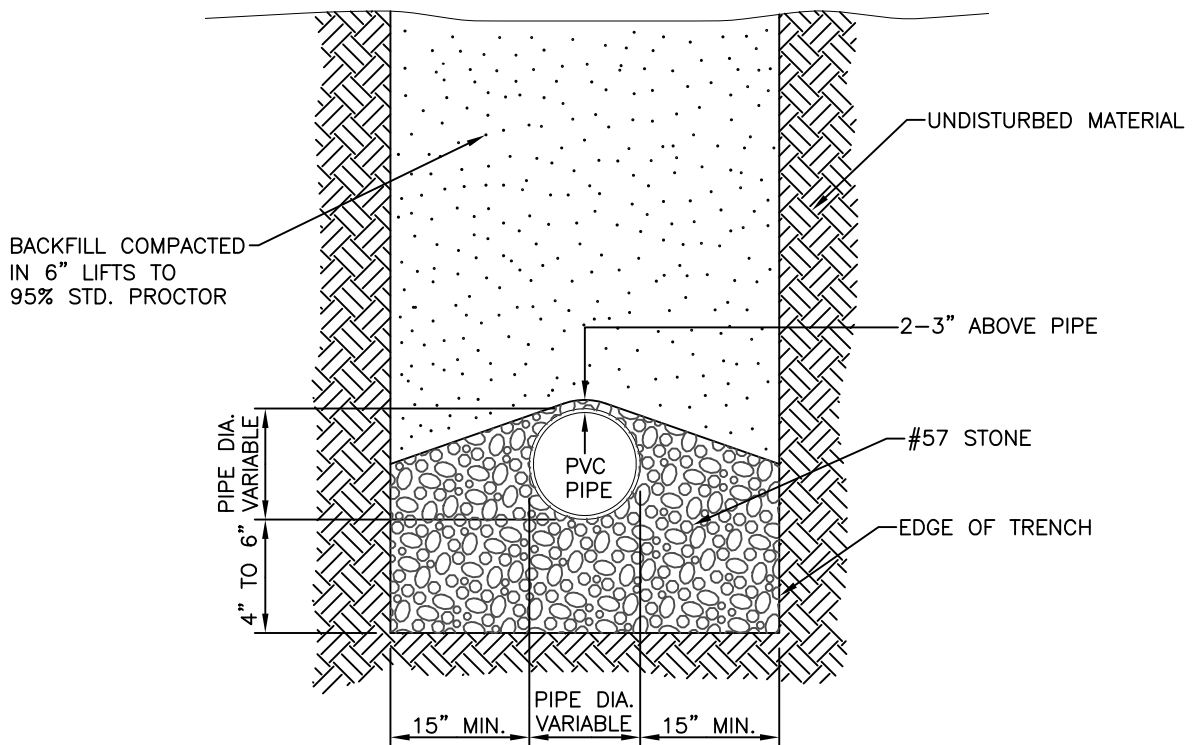
CITY OF DURHAM, NORTH CAROLINA  
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SCALE:  
NTS

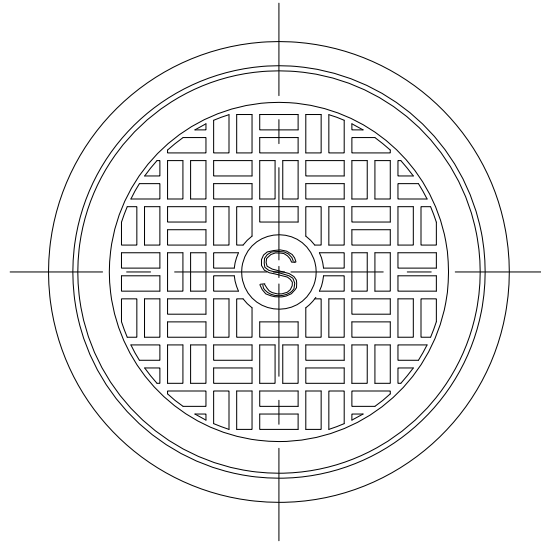
DETAIL NO.  
SS-3.0



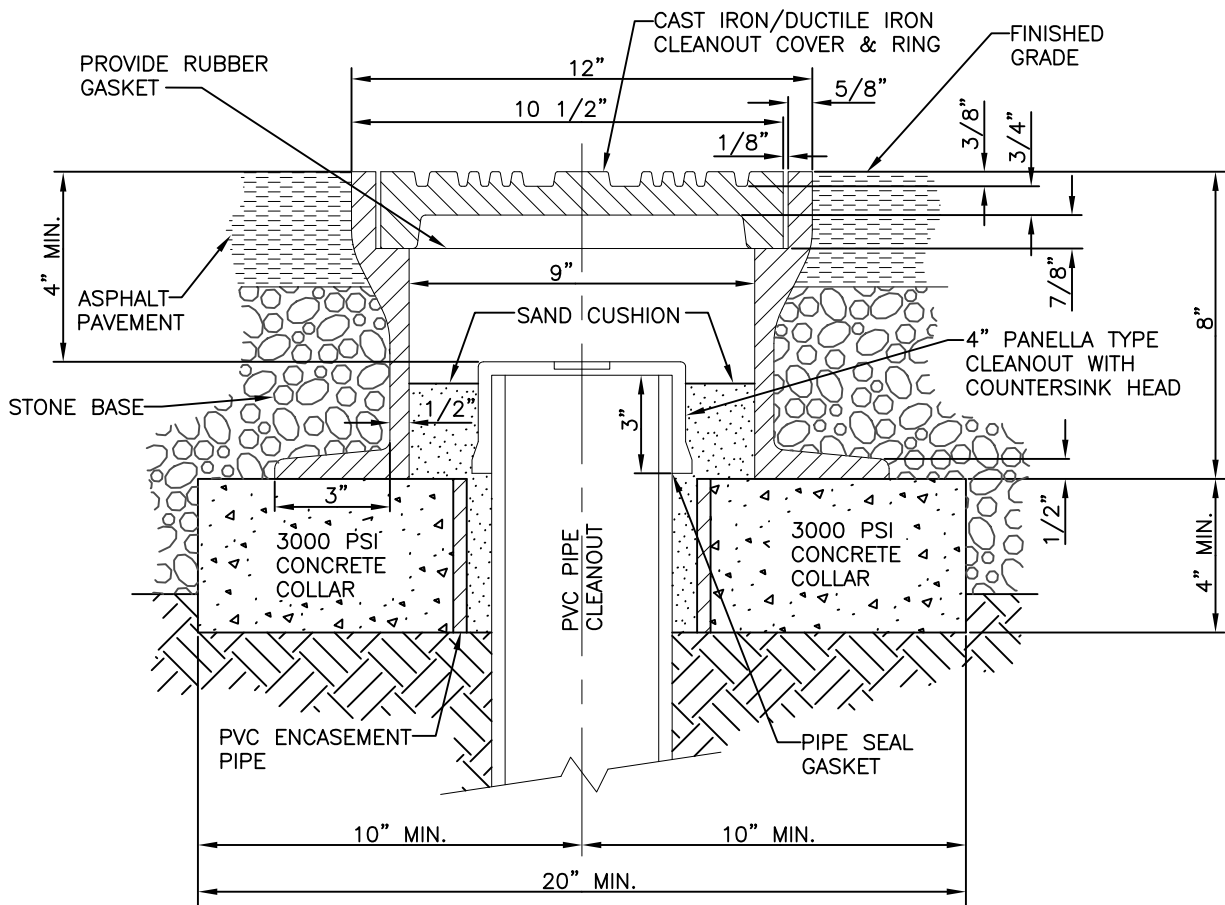
## AIR RELEASE VALVE INSTALLATION FOR SEWER FORCE MAINS



## PVC PIPE BACKFILL



PLAN VIEW



SECTION VIEW



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## SANITARY SEWER TRAFFIC BEARING CLEANOUT

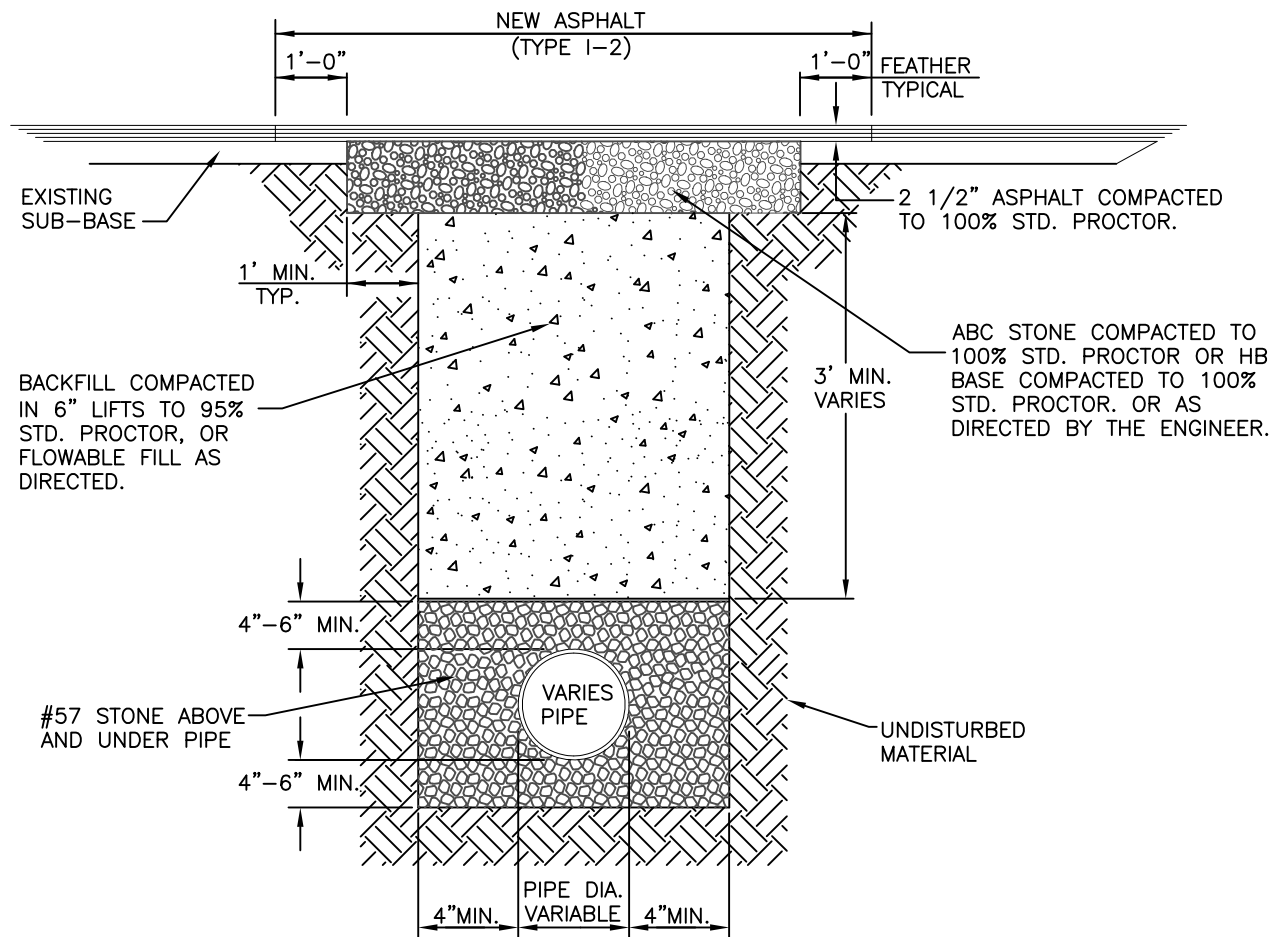
CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
SS-6.0

NOTE:

SEE CITY OF DURHAM STANDARD  
CONSTRUCTION DETAILS FOR  
TRENCHES AND PIPE BEDDING.



# FLOWABLE FILL TRENCH-CUT STREET, WATER, SEWER AND STORMWATER

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## TRENCH CUT INSTALLATION

CITY OF DURHAM, NORTH CAROLINA  
DEPARTMENT OF PUBLIC WORKS

SCALE:  
NTS

DETAIL NO.  
SS-8.0